BC-733

ARMY AIR FORCES
Technical Order No. 08-10-104

INSTRUCTION BOOK

FOR

OPERATION AND MAINTENANCE

OF

RADIO RECEIVING EQUIPMENT RC-103-A

AND

RADIO RECEIVING EQUIPMENT RC-103-AZ

MANUFACTURED BY

WESTERN ELECTRIC COMPANY

ORDER No. 935-WF-42

RESTRICTED

PUBLISHED BY AUTHORITY

OF

THE CHIEF SIGNAL OFFICER

FOR AIRPLANE TYPE_____

AAF SERIAL No._____

DECEMBER 14, 1942

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DECEMBER 14, 1942

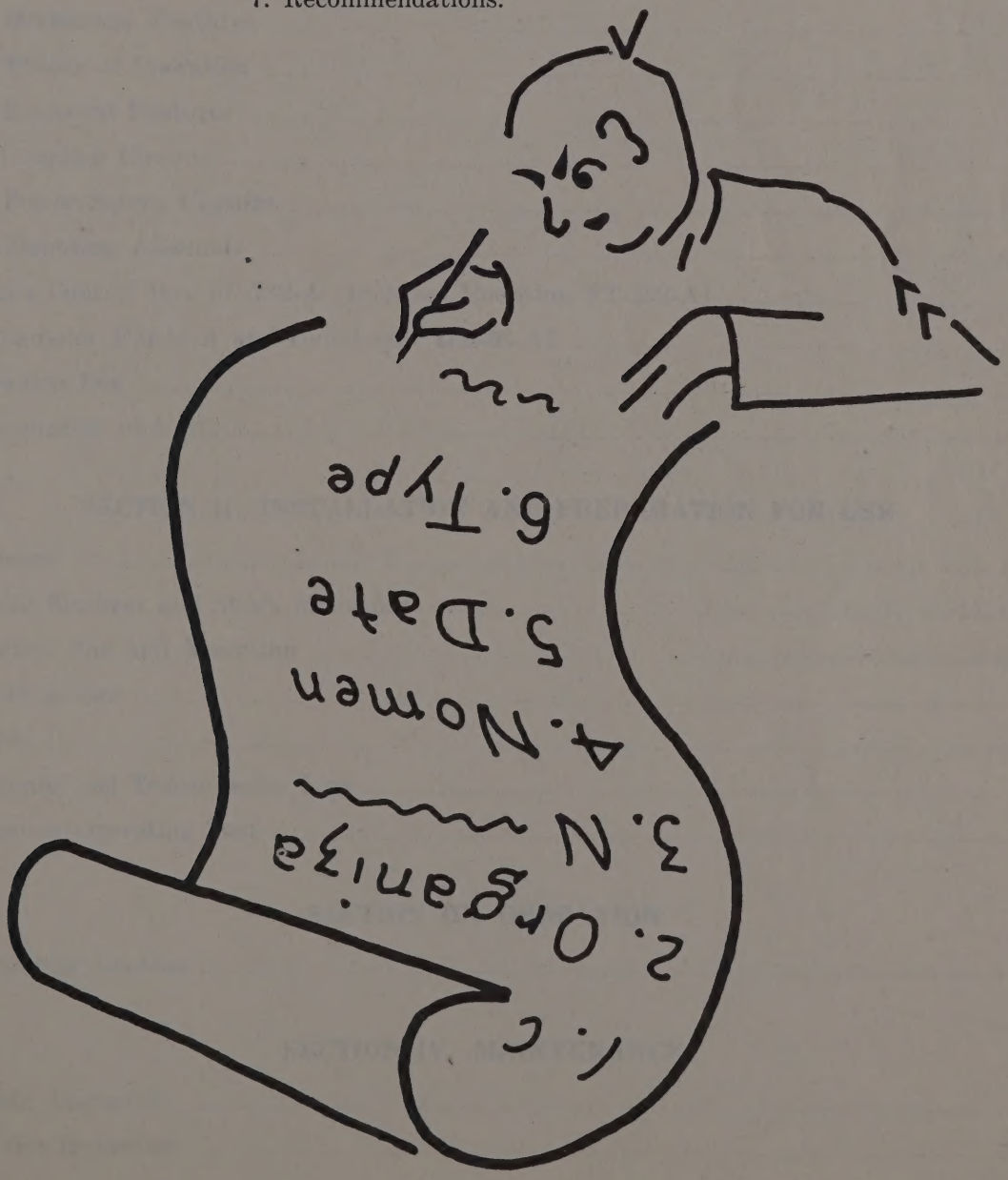
SAFETY NOTICE

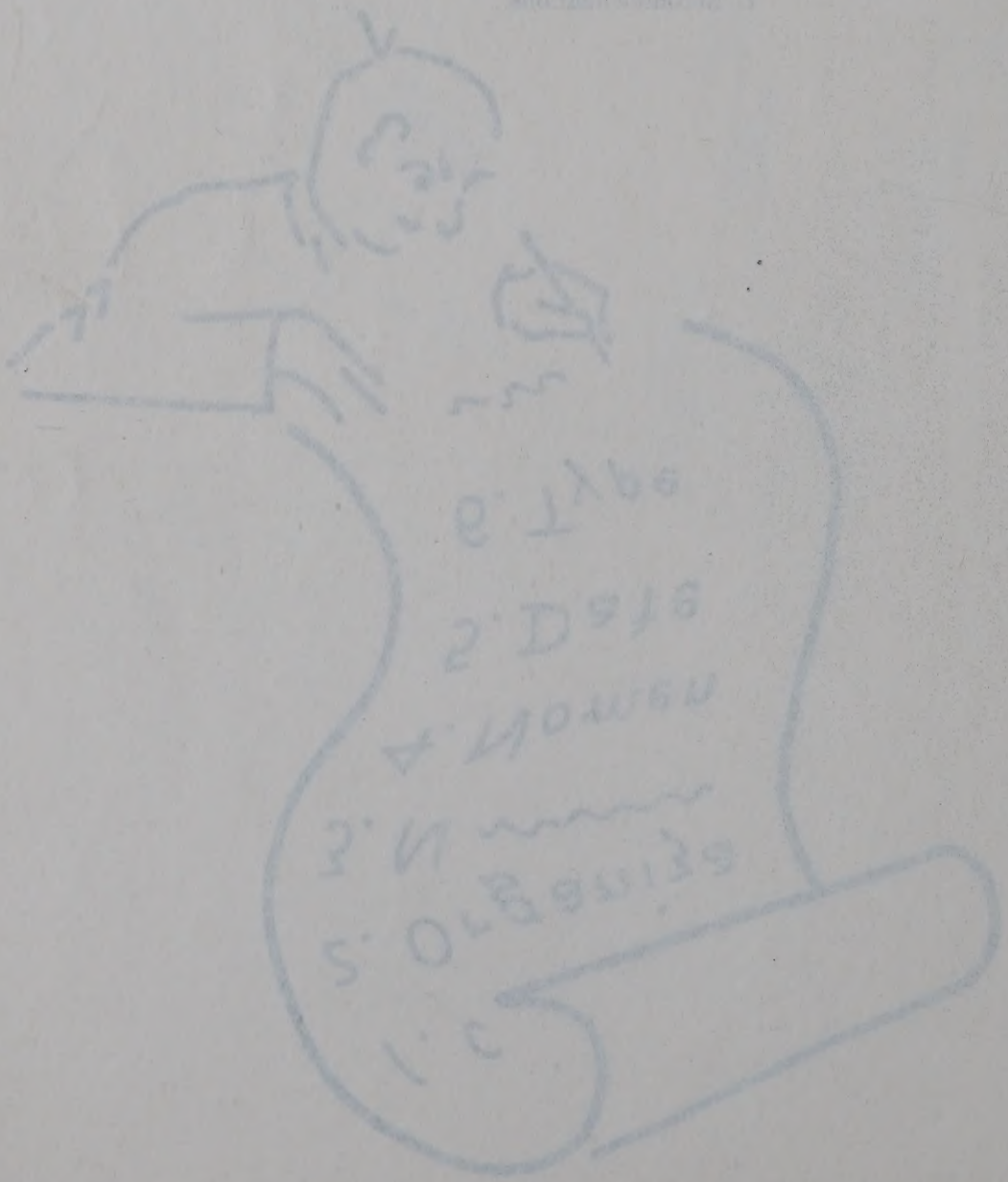
Operation of this equipment involves the use of high voltages which are dangerous to life. Do not change tubes or make adjustments inside any unit of the equipment with the dynamotor running.

REPORT OF MAJOR FAILURE

In the event of major failure of any of the component units of this equipment, a report shall be submitted in the form indicated below. Copies of this report shall be forwarded to the Chief of Signal Section, Air Service Command, Patterson Field, Fairfield, Ohio, and to the Director, Signal Corps Aircraft Signal Service, Wright Field, Ohio.

1. Contract or order number.
2. Organization and station.
3. Nomenclature of equipment.
4. Nomenclature of component unit.
5. Date and nature of failure.
6. Type of airplane in which installed.
7. Recommendations.





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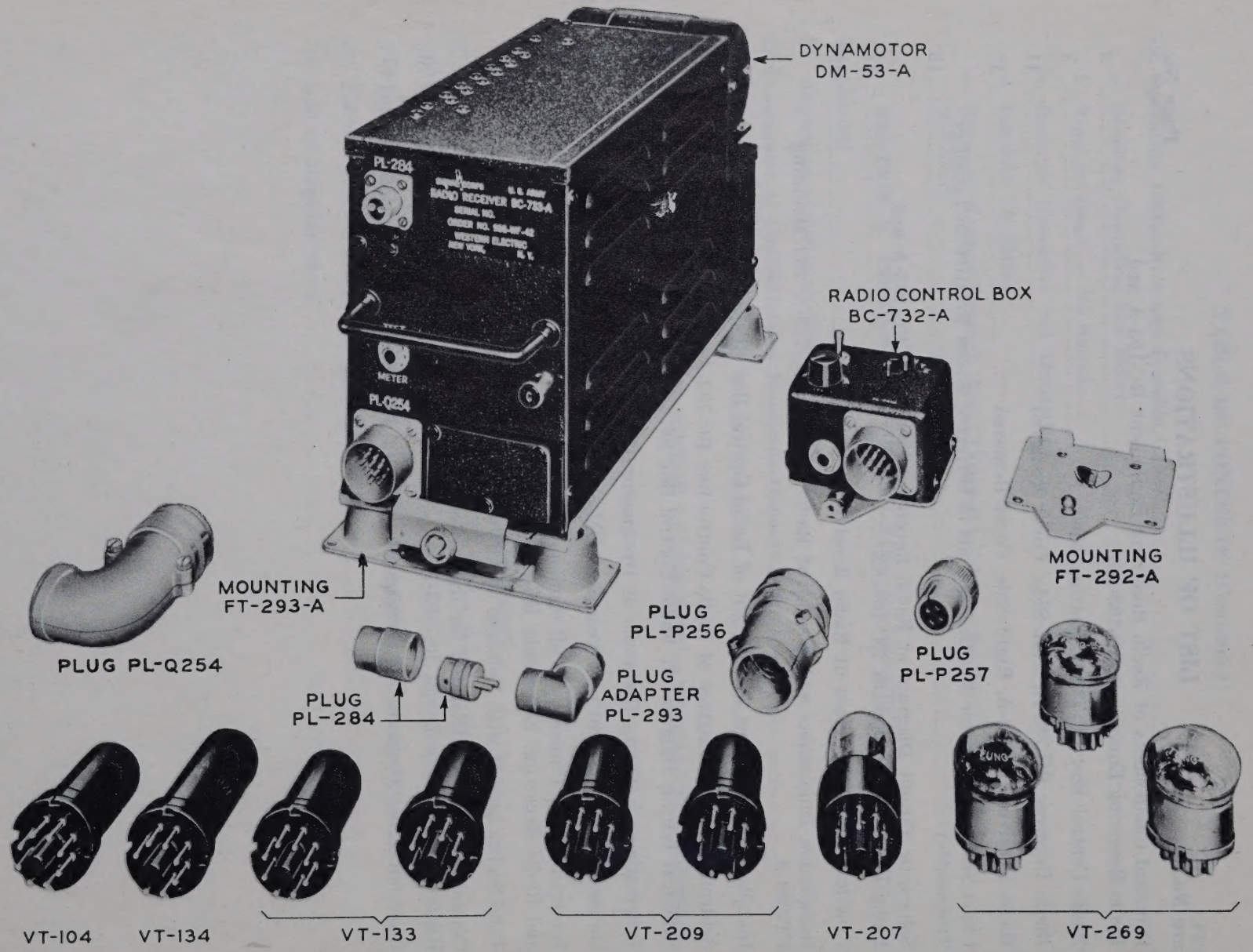


Figure 1 — PRINCIPAL COMPONENTS OF RADIO RECEIVING EQUIPMENT RC-103-A AND RADIO RECEIVING EQUIPMENT RC-103-AZ

SECTION I. DESCRIPTION

1. General

Radio Receiving Equipment RC-103-A and Radio Receiving Equipment RC-103-AZ are airborne equipments designed to give lateral guidance to a pilot during landing operations. Vertical guidance is accomplished by use of barometric altimeter readings over marker beacon stations, or by use of a glide path system which is being developed. The complete ground and airborne equipment is known as Instrument Landing System SCS-151. The complete airborne equipment is known as Radio Set SCR-570, of which Radio Receiving Equipment RC-103-A and AZ, and subsequent procurements is a part. In turn, Radio Receiver BC-733-A and subsequent issues is a part of Radio Receiving Equipment RC-103-A and AZ, and subsequent procurements.

Radio Receiver BC-733-A is designed to operate at six fixed crystal-controlled tuned frequencies of 108.3, 108.7, 109.1, 109.5, 109.9, and 110.3 megacycles. When tuned to any one of these frequencies the receiver is capable of accepting continuous wave radio frequency power, amplitude modulated at two audio frequencies, amplifying and delivering it as audio frequency power to a filter rectifier network where the two audio frequencies are separated and applied to an indicator. The receiver also delivers amplified audio frequency power to head sets simultaneously.

2. List of Component Parts of Radio Receiving Equipment RC-103-A and Radio Receiving Equipment RC-103-AZ

The component parts of Radio Receiving Equipment RC-103-A with significant weights and dimensions are listed in the table below.

Weights and dimensions (approximate) of the components of Radio Receiving Equipment RC-103-A and Radio Receiving Equipment RC-103-AZ are as follows:

	Weight	Length	Width	Height
Radio Control Box BC-732-A	0.56 lb.	3″	3 9/32″	2 5/8″
Mounting FT-292-A	0.07 lb.	4 1/32″	3 1/16″	1/16″
Plug PL-P256 (for control box)	0.106 lb.			
Dynamotor DM-53-A (24 volt) or Dynamotor Dm-53-AZ (12 volt)	2.9 lb.	5″	2¾″	3 1/5″
Radio Receiver BC-733-A	19.2 lb.	13 3/8″	5″	7 3/32″
Mounting FT-293-A	1.75 lb.	13¼″	5 7/8″	1 7/32″
Plug PL-Q254 (for receiving unit)	0.16 lb.			
Plug PL-284 (for receiving antenna) plus				
Adaptor PL-293 (right angle adaptor for Plug PL-284)	0.10 lb.			
Plug PL-P257 (for indicator)				
Tube VT-269				
Tube VT-209				
Tube VT-104				
Tube VT-134				
Tube VT-207				
Tube VT-133				
Indicator I-101-C (cross pointer instrument)				

The following equipment is required but is not part of Radio Receiving Equipment RC-103-A.

Antenna AN-100

Cable WC-551-B (antenna transmission line)

Plug PL-284 (antenna)

Resistor RS-125, 1000 ohm, 0.5 watt (to provide equivalent resistance when only one indicator is installed)

Fuse, 10 amp

The following additional equipment is necessary in some installations:

Additional Plug PL-293 (right angle adaptor)

Additional Indicator I-101-C (for use in large aircraft, co-pilot position)

Additional Indicator Plug PL-P257

Bulkhead Adaptor PL-285 (with two additional PL-284)

3. Table I — Vacuum Tube Characteristics

The following table gives significant constants of the vacuum tubes within their operating range in this receiver, as well as the commercial designation that is equivalent to the Signal Corps nomenclature:

Commercial Designation	12567	WF-717A	12SR7	12A6	12SQ7	12AH7-GT
Signal Corps Designation	VT-209	VT-269	VT-133	VT-134	VT-104	VT-207
Heater Voltage	12.6 v	6.3 v	12.6 v	12.6 v	12.6 v	12.6 v
Heater Current	0.15 amp.	.175 amp.	0.15 amp.	0.15 amp.	0.15 amp.	0.15 amp.
Control Grid Voltage	—1 v	—2 v	—9 v	—12.5 v	—2 v	—6.5 v
Screen Grid Voltage	125 v	120 v	—	250 v	—	—
Screen Grid Current	0.0044 amp.	0.0024 amp.	—	0.0035 amp.	—	—
Plate Voltage	250 v	180 v	250 v	250 v	250 v	180 v
Plate Current	0.0118 Amp.	0.0077 amp.	0.0095 amp.	0.030 amp.	0.0009 amp.	0.00076 amp.
Amplification Factor	4230	2540	16	210	100	16
Plate Resistance	900,000 ohms	620,000 ohms	8,500 ohms	70,000 ohms	91,000 ohms	8,400 ohms
Mutual Conductance	4700 μmhos	4100 μmhos	1900 μmhos	3000 μmhos	1100 μmhos	1900 μmhos

4. Radio Receiver BC-733-A

(Includes Mounting FT-293-A)

a. *Mechanical Features*

Radio Receiver BC-733-A consists of a set box including coupling circuits, tube sockets, crystals and the tuned circuits required for the reception of radio signals. Mounting arrangements for Dynamotor DM-53-A or Dynamotor DM-53-AZ are provided on the back end of the set box. The receiver circuit is shown in Figure 6 and a wiring diagram appears in Figure 7. The external dimensions and weight are shown in Figure 8.

The receiver case is of welded steel. The back end is depressed to accommodate the dynamotor unit. The right hand side provides access to the vacuum tubes. The left hand side when removed exposes the wiring. On the front end of the box are mounted a handle to facilitate installation and removal from the shock mounting, receptacle 85 for the antenna, receptacle 86 (socket for Plug PL-Q254) for the control and output circuit wiring, and a cover providing access to the course sensitivity control 89 and indicator centering control 90. Internally, the receiver box is divided into compartments to provide shielding between parts of the circuit likely to cause interference with each other.

b. *Theory of Operation*

Radio Receiving Equipment RC-103-A differs from the more familiar communication and broadcast type receivers, particularly in respect to the method of tuning. In this receiver the tuning band covered is only 2 per cent of the lowest resonant frequency of the receiver, so that the requirements of image rejection, intermediate frequency rejection, and freedom from adjacent channel interference can be met without the necessity of tuning the r-f stage and the antenna coupling circuit to each individual channel. The tuned circuits in these locations are therefore made up in the form of a band-pass filter covering the required receiver tuning range, and all tuning is accomplished by simply varying the oscillator frequency.

Since only six resonant frequencies are required in the tuning range of this receiver, it is feasible to provide crystal control on the heterodyne oscillator, thereby permitting the use of a rather sharply tuned and

highly selective intermediate frequency amplifier. The oscillator frequency is selected, and in consequence, the receiver is tuned by connecting any one of six crystals to the grid of the heterodyne oscillator. This operation is performed by relays which provide a convenient means of remote control tuning.

The heterodyne frequencies required for the i-f frequency chosen are too high to be controlled directly by the crystals. The heterodyne oscillator is therefore designed to operate at the 18th sub-harmonic of any one of the six heterodyne frequencies, thus making crystal control of the oscillator feasible. The crystal controlled frequencies are then stepped up by harmonic generators to the required frequencies for producing the desired i-f frequency when heterodyned with the received signal frequencies. The tuned circuits of the harmonic generators also form a band-pass filter, covering the required range of heterodyne oscillator frequencies and harmonics of those frequencies.

From the foregoing discussion, it is seen that the major part of the selectivity in Radio Receiver BC-733-A is provided by the i-f tuned circuits, while i-f rejection and the rejection of spurious responses including the image frequencies is provided by the tuned circuits of the r-f amplifier and the antenna coupling coil.

The detailed operation of the various units comprising Radio Receiver BC-733-A will be described below under the headings "Electrical Features" and "Coupling Circuits".

c. *Electrical Features*

Electrically, Radio Receiver BC-733-A comprises the following circuits:

(1) One stage of radio frequency amplification which amplifies efficiently any of the six incoming signal frequencies which the receiver is intended to accommodate. This stage uses Tube VT-269 (111-1).

(2) A mixer stage in which the incoming radio frequency is heterodyned with a frequency generated in the receiver to produce the intermediate frequency. This stage also employs Tube VT-269 (111-2).

(3) A two-stage intermediate frequency amplifier which amplifies one of the products of the heterodyne action of the mixer. Tube VT-209 (112-1) and Tube VT-209 (112-2) are used in the intermediate frequency amplifier.

(4) A combination detector, voltage regulator, audio frequency amplifier, and electronic switching tube, Tube VT-104 (113). This tube demodulates the heterodyned received signal and provides a variable d-c voltage for regulating the bias on the control grids of the radio and intermediate frequency amplifier tubes in accordance with the strength of the received signal, so that when the signal has exceeded a predetermined minimum value the input to the detector remains substantially constant regardless of any further increase in signal strength. This tube also automatically disables the automatic volume control action when the signal strength is less than this predetermined value, and delivers amplified audio frequency signal voltage to the audio frequency amplifier tube.

(5) An oscillator and frequency multiplier. This section employs Tube VT-207 (115) and Tube VT-269 (111-3). The first triode section of Tube VT-207 (115), is employed as a crystal controlled oscillator, oscillating by virtue of the positive feedback provided by the grid to plate capacitance at any of the six crystal frequencies available under the remote control of relays associated with the individual crystals. Since the crystal frequencies practically available are too low for heterodyning the incoming signal frequencies it is necessary to employ their harmonics for the heterodyne frequency. The second section of Tube VT-207 (115) and Tube VT-269 (111-3) are employed as frequency multipliers and the resultant 18th harmonic of the crystal frequency is applied to the mixer stage described in (2) above.

(6) A grid bias supply oscillator. In the voltage regulator type of automatic volume control, a negative voltage of around 100 volts with respect to the cathodes of the controlled tubes is required. To obtain

this voltage without sacrificing part of the anode voltage available from the dynamotor and to obtain favorable regulation characteristics this bias voltage is generated by a combined radio frequency oscillator and rectifier tube. This is Tube VT-133, Ref. No. 116-1, in which the triode section functions as the radio frequency oscillator and the diode sections serve as the rectifier.

(7) An audio frequency amplifier, employing Tube VT-134 (114), which provides an output for aural monitoring.

(8) An audio frequency amplifier, employing Tube VT-133 (116-2) for operating the visual indicator.

d. *Coupling Circuits*

Radio frequency amplifier 111-1 is coupled to balanced antenna receptacle 85 by condenser 2 and an electro-statically shielded coupling coil 61 tuned by a fixed condenser 1-1. The output of this stage is coupled to mixer tube 111-2 by a coupling circuit consisting of condenser 5 and radio frequency coils 62-1 and 62-2 tuned by fixed condensers 1-2 and 27 respectively.

The output of the mixer tube is coupled to the first intermediate frequency amplifier tube 112-1 by a coil assembly 120-1 (including coils 69-1 and 70-1) and resistor 36. The primary coil 69-1 is tuned by condensers 24-1 and 24-2 in parallel while secondary coil 70-1 is tuned by condensers 24-3 and 24-4. Each pair of parallel condensers has capacity versus temperature variation characteristics complementary to those of the coil winding. Decoupling resistors 33-3 and 45-1 and by-pass condensers 25-1 and 25-2 are included in this coil assembly.

Second intermediate frequency amplifier tube 112-2 is coupled to the first by a coil assembly 120-2 including coils 69-2 and 70-2. The primary coil 69-2 is tuned by parallel condensers 24-5 and 24-6, while parallel condensers 24-7 and 24-8 tune the secondary 70-2. Each pair of condensers has temperature compensating characteristics. Decoupling resistors 33-4 and 45-2 by-passed by condensers 25-3 and 25-4 are included in this coil assembly.

Detector and automatic volume control tube 113 is coupled to the second intermediate frequency amplifier tube by a coil assembly 121 including coils 69-3 and 70-3. In this assembly primary coil 69-3 is tuned by parallel condensers 24-9 and 24-10, and secondary coil 70-3 by parallel condensers 24-11 and 24-12. Each pair of condensers has temperature compensating characteristics. Decoupling resistor 33-5 by-passed by condenser 25-5 is included in this coil assembly.

The output voltage of the detector diode in 113, which includes both rectified carrier and the recovered audio frequency signal, is developed in resistors 39-1 and 39-2 bypassed by condensers 9-1 and 9-2. The triode grid in 113 is coupled to the diode circuit by resistor 38 and condenser 7-2. When any signal is received and a d-c voltage representing the received carrier is developed in resistors 39-1 and 39-2, the grid of the triode section of 113 is biased negatively by an amount proportional to the magnitude of the received carrier. The cathode current through cathode resistor 43 decreases and, in effect, the cathode becomes more negative with respect to the positive side of the common anode supply voltage. This variation in cathode voltage with carrier strength is utilized to provide automatic volume control.

The second diode plate in 113 is biased negatively with respect to ground by connection to the junction of resistors 31 and 39-3 through diode load resistor 40-3. This voltage is the normal no-signal bias voltage for the radio frequency and intermediate frequency amplifier tubes. The second diode plate and the no-signal bias voltage from junction of 31 and 39-3 are coupled to the automatic volume control filter through resistor 40-2. This filter, which prevents audio-frequency ripple in the automatic volume control bus, consists of resistor 41-1 and condensers 4-5 and 13. The automatic volume control bus couples the output of the filter to the control grid of the radio frequency amplifier tube through grid resistor 30, to the control grid of the first intermediate frequency amplifier tube 112-1 through decoupling resistor 45-1 by-passed by condenser 25-2, and to the control grid of the second intermediate frequency amplifier tube 112-2 through decoupling resistor 45-2 by-passed by condenser 25-4.

When no signal is received or when the received signal is too weak to drive the cathode potential below the potential established on the second diode plate by voltage divider resistors 31 and 39-3, no current can flow to the diode plate and hence no connection exists between the cathode and the automatic volume control circuit. Variations in cathode potential up to this point will therefore have no effect on the receiver gain.

When a received signal is strong enough to drive the cathode negative with respect to the second diode plate, current flows through the resultant electron stream and the two electrodes are in effect connected together. Any further reduction in the cathode potential produces automatic volume control action on the r-f and i-f amplifier tubes. Thus, the combination of fixed and variable electrode voltages in 113 provides delayed automatic volume control by virtue of the electronic switching action just described.

The grid circuit of the audio frequency amplifier section used for aural monitoring and consisting of resistors 40-1 and 46-3 and condenser 11, is coupled directly to the cathode of 113, the triode of which acts as an audio amplifier tube. The cathode of audio amplifier tube 114 is self-biased through resistor 33-2, by-passed by condenser 12-1. The output of tube 114 is coupled through output transformer 82 to terminals G, F and A on receptacle 86. Resistor 54-1 between terminal 3 of 82 and terminal G on receptacle 86 prevents excessive reduction of the load impedance into which audio amplifier 114 works when the volume control on Radio Control Box BC-732-A is turned counterclockwise for low volume. Negative feedback is employed in the audio amplifier to prevent excessive distortion due to impedance mismatch in the plate circuit of 114 as the volume control setting is changed. This feedback is obtained by a connection between low impedance output terminal 2 on output transformer 82 and in the junction of resistors 46-3 and 40-1 in the grid circuit of 114.

The visual indicator circuit amplifier tube 116-2 is coupled to the cathode of the detector and automatic volume control amplifier tube 113 by a condenser 10A, resistors 44-2 and 56, and sensitivity control potentiometer 89. Resistors 44-2 and 56 are employed to limit maximum and minimum sensitivity. Amplifier tube 116-2 is self-biased through resistor 33-1 by-passed by condenser 12-2. The plate voltage for vacuum tube 116-2 is fed through a choke 66. The output signals from vacuum tube 116-2 are coupled to transformer band-pass filter networks 83 and 84 through condenser 21, balance control potentiometer 90 which regulates relative amounts of 90 and 150 cycle signals introduced into the filters, and normally shorted equalizing resistors 46-1 and 46-2 provided to supplement the adjustment of balance control potentiometer 90 if required.

The output terminals of transformer band-pass filter networks 83 and 84 are coupled to "Varistor" (copper oxide rectifier-special) 91 through series resistors 47-1 and 47-2. The output terminals of 91 are in turn connected to terminals D and E on the receiver receptacle 86 (socket for Plug PL-Q254). Load resistors 48-1 and 48-2 are bridged across the output of 91.

The plate circuit of the bias oscillator tube 116-1 is coupled to the grid circuit by tapped inductor 71A tuned by condenser 17. The grid circuit consists of resistor 52 and blocking condenser 8-14. The diode rectifier section of 116-1 is coupled to the plate circuit both inductively through the coupling between inductors 71B and 71A, and electrostatically by condenser 26-2. The rectified output of 116-1 is coupled to the junction of resistors 39-3 and 43 by a filter circuit consisting of resistor 45-3 and condensers 20A and 20B.

One triode of vacuum tube 115 serves as a heterodyne oscillator. Its grid circuit is connectable to any one of the crystal units 92 to 97 inclusive by remote control operation of the corresponding relays 81-1 to 81-6 inclusive. The grid bias for the oscillator section of 115 is developed across resistors 44-1 and 57-1 in series. The plate load circuit of the oscillator consists of inductor 63 tuned by condenser 14, in series with inductor 64 tuned to anti-resonance at three times the mean crystal frequency by condenser 15. The grid circuit of the second triode section

of 115, consisting of bias resistors 34-2 and 57-2 in series, is coupled to the plate circuit of the first triode section at the junction of inductors 63 and 64 by condenser 26-1 so that only the third harmonic of the crystal frequency is impressed on the second triode grid.

The plate circuit of the second triode section of 115 is coupled to the grid circuit of vacuum tube 111-3 by inductively coupled coils 65-1 and 65-2, tuned by distributed capacities in their respective plate and grid circuits to the ninth harmonic of the mean crystal frequency. Grid bias for tube 111-3 is developed in resistors 34-3 and 57-3 by-passed by condenser 8-3.

The plate circuit of tube 111-3 is coupled to the control grid circuit of mixer tube 111-2 by inductively coupled coils 62-3 and 62-4 tuned to 18 times the mean crystal frequency by condensers 18 and 19 respectively, and by condenser 6.

e. *Power Supply Circuits*

The power supply for Radio Receiver BC-733-A is designed for either 12-volt or 24-volt operation. Change from one primary voltage to the other is made simply by plugging the properly rated dynamotor unit into receptacle 87. Resistor 51 limits the current through the crystal control relays to the proper value when the 24-volt power supply is used. The heater circuits are arranged so that on 12-volt operation the 12-volt heaters of tubes 112-1, 112-2, 113, 114, 115, 116-1, and 116-2 are in parallel, the 6-volt heaters of tubes 111-1 and 111-2 are in series across the 12-volt supply, and the 6-volt heater of tube 111-3 is in series with resistor 50, also across the 12-volt supply. On 24-volt operation, the 12-volt heaters of tubes 112-2, 113, 114, 115, 116-1 and 116-2 are connected in series parallel across the 24-volt supply, the 12-volt heater of tube 112-1 is in series with the two 6-volt heaters of tubes 111-1 and 111-2 across the 24 volts, and the 6-volt heater of tube 111-3 is in series with resistors 50 and 49, also across the 24 volts. The heaters of the tubes are by-passed as follows: tube 111-1 by condenser 3-3, tube 111-2 by condenser 3-2, tube 113 by condenser 8-5, and tube 116-2 by condenser 7-3. These by-pass condensers prevent the possibility of regeneration or admittance of dynamotor noise in the cathode circuits.

The primary of the dynamotor circuit is provided with a radio frequency choke 68 which helps prevent commutator ripple from reaching the input circuits of the receiver through the heater circuits.

Plate voltage to audio amplifier tube 114 is applied directly from the dynamotor output and shunted by condensers 23, 22B and 3-4. All other anode voltages are filtered by choke 67 and condensers 22A, 22B, 3-4, and 23. Some of the plate and screen supply circuits employ decoupling resistors and by-pass condensers as follows:

1. R-F amplifier tube 111-1 plate circuit by-passed by condenser 4-1, screen decoupled by resistor 41-2 and by-passed by condenser 3-1.
2. Mixer tube 111-2 plate circuit decoupled by resistor 33-3, by-passed by condenser 25-1, screen decoupled by resistor 32, by-passed by condenser 4-3, and cathode by-passed by condensers 7-1 and 4-2.
3. I-F amplifier tube 112-1 plate circuit decoupled by resistor 33-4, by-passed by condenser 25-3, screen decoupled by resistor 37-1, by-passed by condenser 8-1.
4. I-F amplifier tube 112-2 plate circuit decoupled by resistor 33-5, by-passed by condenser 25-5, screen decoupled by resistor 37-2, by-passed by condenser 8-2.
5. Oscillator half of tube 115 plate circuit decoupled by resistor 42-2, by-passed by condenser 16-1.
6. Harmonic generator half of tube 115 plate circuit decoupled by resistor 42-1, by-passed by condenser 8-15.
7. Harmonic generator tube 111-3 plate circuit decoupled by resistor 33-6, by-passed by condenser 4-6, screen decoupled by resistor 37-3, by-passed by condenser 8-4.
8. Bias oscillator tube 116-1 plate circuit decoupled by resistor 54-2, by-passed by condenser 20C.

f. *Mounting Assembly*

Mounting FT-293-A, shown in Fig. 8, consists of a channeled frame 1 supported on

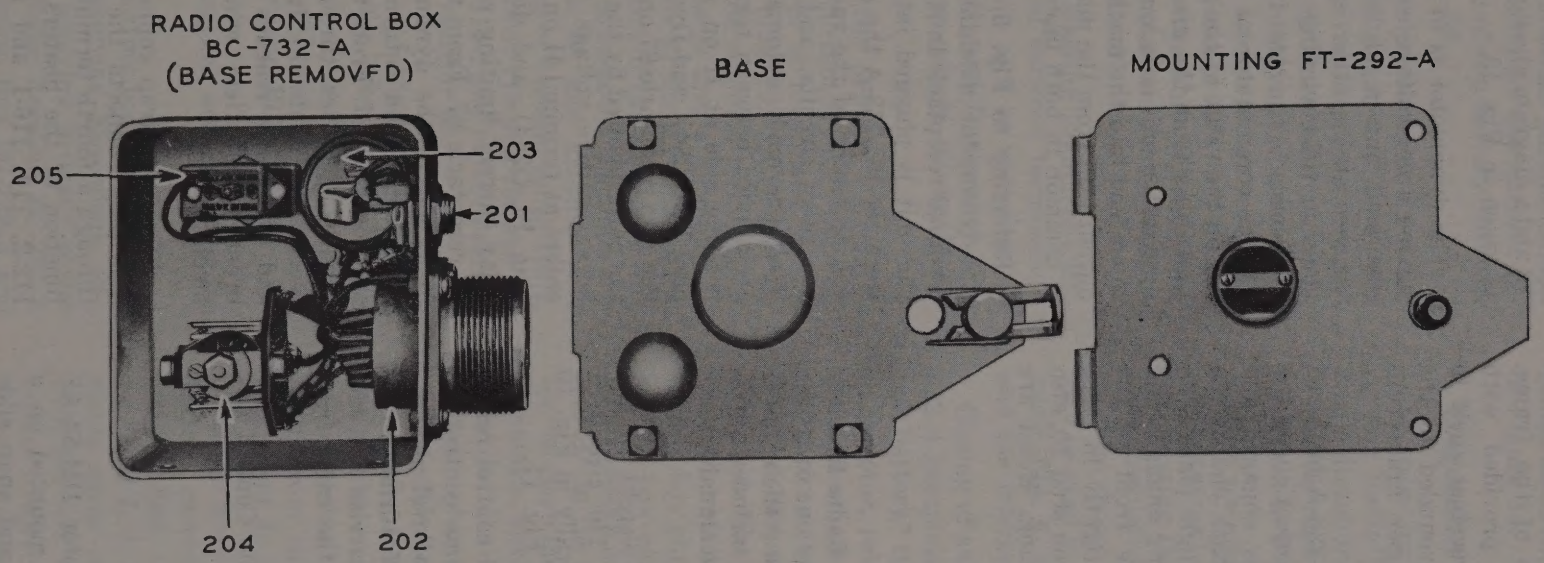


Figure 2 — RADIO CONTROL BOX BC-732-A, BOTTOM VIEW

each corner by shock absorbing cup assemblies 2 fastened to cross-members 3 and 4 at the front and rear ends of the frame. These cross-members are provided with holes for fastening to the receiver shelf in the plane. The frame is grounded to the front cross-member by copper braid connectors 5 and 6.

When Radio Receiver BC-733-A is placed on Mounting FT-293-A, a projection on the rear of the receiver box is engaged and secured in flange 7 on the back end of the mounting frame. Movable angle plate 8 on the front end of the mounting engages and secures a projection on the front of the receiver box, and is locked tightly in place by tightening knurled nut 9 on stud 10, also on the front of the mounting. Holes are provided for safety wiring.

5. Radio Control Box BC-732-A

(Includes Mounting FT-292-A)

This unit provides for monitoring Radio Receiver BC-733-A, for remote tuning to any one of its six resonant frequencies, and for turning the receiver on or off. The monitoring circuit includes a volume control for adjusting the audio signal level in the operator's head set.

The principal dimensions and weight of the control box are shown on Fig. 9. The circuit of the control box is shown schematically in Fig. 10 and a wiring diagram is shown in Fig. 11.

Switch 204 operates the crystal control relays in Radio Receiver BC-733-A. Volume control potentiometer 203 adjusts the audio level at monitoring jack 201. Toggle switch 205 turns the set "OFF" or "ON". Receptacle 202 carries the connections from the control box to the cable from the aeroplane junction box.

A single snap slide secures Radio Control Box BC-732-A to Mounting FT-292-A.

6. Dynamotor DM-53-A and Dynamotor DM-53-AZ

Dynamotor DM-53-A and Dynamotor DM-53-AZ consist of a dynamotor machine mounted on a base containing an 8-prong plug and snap slide fasteners for holding the unit in place on the rear of the set box for Radio Receiver BC-733-A. Schematic and wiring diagrams are shown in Fig. 12 and a diagram showing dimensions and weights is given in Fig. 13.

The dynamotor is of the totally enclosed type, having a low-voltage commutator and brushes at one end, and a high-voltage commutator and brushes at the other end. Current is fed to the common field winding from the 24 to 28.5 volt d-c source*. Current is drawn from the high-voltage commutator at 190 to 224 volts, depending on the value of the applied low voltage. Three leads pass from the machine into the plug on the dynamotor unit base, one serving as a low-voltage input lead into the machine, one as a high-voltage output lead from the machine, and one lead which is common to both input and output.

Referring to Fig. 6, the connections between the dynamotor machine and the 8-prong (plug) terminal receptacle in its base are such that when the unit is plugged into receptacle 87 on Radio Receiver BC-733-A the proper connections for 24-volt operation of the vacuum tube heater circuits, the relay circuits, and the dynamotor machine itself are made automatically. Thus, if 24 volts are applied between terminals A and H with the positive side at H on receptacle 86 (socket for plug PL-Q254), and Dynamotor DM-53-A is plugged into receptacle 87 on Radio Receiver BC-733-A the path followed by the primary current is as follows: positive voltage from the 24-volt battery enters at terminal H on receptacle 86 (socket for plug PL-Q254), and divides at the junction of relay current limiting resistor 51 and a terminal on receptacle 87. From the terminal on receptacle 87 it enters the dynamotor unit plug where a strap connection returns it to another terminal on receptacle 87. From this terminal it enters r-f choke 68, passes through a third terminal on receptacle 87 into the dynamotor unit plug again, and eventually reaches the positive low voltage brushes and field winding of the dynamotor machine.

A second strap connection on the dynamotor unit plug connects the positive battery voltage through a fourth terminal on receptacle 87 to the junction of the heaters of vacuum tubes 112-1, 112-2, 114, 116-1 and resistor 49. The parallel connected heaters of vacuum tubes 112-1, 112-2, 114 and 116-1 and resistor 49 are connected in series with the parallel connected heaters of vacuum tubes 111-1 and 111-2 in series, 113, 115,

*For Dynamotor DM-53-AZ the d-c source is 12 to 14.25 volts.

116-2, and vacuum tube 111-3 in series with resistor 50. From the second series parallel combination of heaters and resistance the current returns to the negative side of the battery through terminal A on receptacle 86.

The current through the low voltage side of the dynamotor returns to the negative side of the battery through a terminal on receptacle 87 and terminal A of receptacle 86 (socket for plug PL-Q254). Current from the high voltage side of the dynamotor flows through a terminal on receptacle 87 to the junction of condensers 22B, 3-4, 23, and inductor 67. It returns to the high voltage negative brush on the dynamotor through the common negative on receptacle 87.

In the case of Radio Receiving Equipment RC-103-AZ 12 volts is applied between terminals A and C with the positive side at C on receptacle 86 (socket for plug PL-Q254), and Dynamotor DM-53-AZ is plugged into receptacle 87 on Radio Receiver BC-733-A.

The path followed by the primary current is then as follows: positive current from the 12 volt battery enters the receiver at terminal C on receptacle 86 (socket for plug PL-Q254) and divides at the junction of the common terminals of relays 81-1 to 81-6 inclusive and a terminal on receptacle 87. On receptacle 87 the terminal strapping is arranged so that part of the current enters the positive side of the dynamotor machine primary through r-f choke 68 and another part passes through the heaters of vacuum tubes 116-1, 116-2, 114, 115, 112-2, 112-1, 113 and resistor 49 in parallel, vacuum tubes 111-1 and 111-2 in series, and 111-3 in series with resistor 50.

From the negative side of the dynamotor primary and the vacuum tube heaters the current returns to the negative side of the battery through a terminal on receptacle 87 and terminal A on receptacle 86 (socket for plug PL-Q254).

7. Junction Box (Not supplied as part of Order No. 935-WF-42)

This unit is an interconnecting board for the separate parts of Radio Receiving Equipment RC-103-A. It provides for supplying primary power with fuse protection to Radio Receiver BC-733-A and connecting Radio Control Box BC-732-A and the visual indicator circuits to the receiver. The governing interconnecting diagram for all units of Radio Receiving Equipment RC-103-A is shown in Figure 14.

8. Cooperation of Units

In an operating installation the various units comprising Radio Receiving Equipment RC-103-A or Radio Receiving Equipment RC-103-AZ are connected through cables to the airplane junction box as shown in Fig. 16.

Each terminal of the junction box is lettered, and is connected through a cable wire to a terminal bearing the same letter on a plug and receptacle associated with a unit of the receiving equipment as shown in Fig. 6. The following discussion may be read in connection with the receiver schematic Fig. 6, the control box schematic Fig. 10, and the interconnecting diagram Fig. 14.

Closing of switch 205 on Radio Control Box BC-732-A completes the circuit from the 24 to 28.5 volt battery* through the junction box fuse to the dynamotor, relay circuit and filament circuits of Radio Receiver BC-733-A. Current is drawn from the battery through the fuse, terminal C in the junction box, over the control box cable to terminal C on the control box plug and receptacle, through switch 205, back to terminal H on the control box plug and receptacle, back through the control box cable to terminal H in the junction box, through a cross-connection to another terminal H* in the junction box, over the receiver cable to terminal H* on the receiver plug and receptacle, through the dynamotor, filament, and relay circuits of the receiver to terminal A on the receiver plug and receptacle, back over the receiver cable to terminal A on the junction box, and finally, to the battery again. Closing of switch 205 on the control box thus completely energizes the receiving equipment, opening it removes all drain from the battery as far as the receiving equipment is concerned.

Switch 204 on the control box connects negative battery carried through on terminals A on the junction box, the control box, and the receiver, to terminal I, J, K, L, M or N on the control box. Cable wires carry these terminals through the junction box terminals designated by the same letters to corresponding terminals on the receiver, thence to crystal relays 81-1 to 81-6 inclusive and finally back to positive battery through terminal H* on the receiver and junction box. Thus when

*12 to 14.25 volt battery on Radio Receiving Equipment RC-103-AZ.

*Terminal C for Radio Receiving Equipment RC-103-AZ.

the receiver is energized the set may be tuned by remote control, using switch 204 on the control box, to any one of its six resonant frequencies. The radio frequency signals enter the receiver from a balanced transmission line through Plug PL-284, the audio and visual signals are recovered, and leave the receiver over the interconnecting cable circuits as follows: High impedance audio output signals are carried on terminals A and G through the receiver plug and receptacle into the junction box. Low impedance audio output signals are carried on terminals A and F through the receiver plug and receptacle into the junction box. Either high or low impedance audio signals depending on the junction box strapping are carried through terminals G and A into the control box where they pass through volume control potentiometer 203 to telephone jack 201, and thence into an operator's head set if one is plugged into jack 201. A parallel connection to jack 201 is returned to the junction box over terminals A and F so that audio signals may be distributed to other head sets in the plane if desired.

Visual output signals are carried on terminals D and E through the receiver plug and receptacle, through the junction box, and over terminals A and B to the runway localizer winding of the cross pointer instrument.

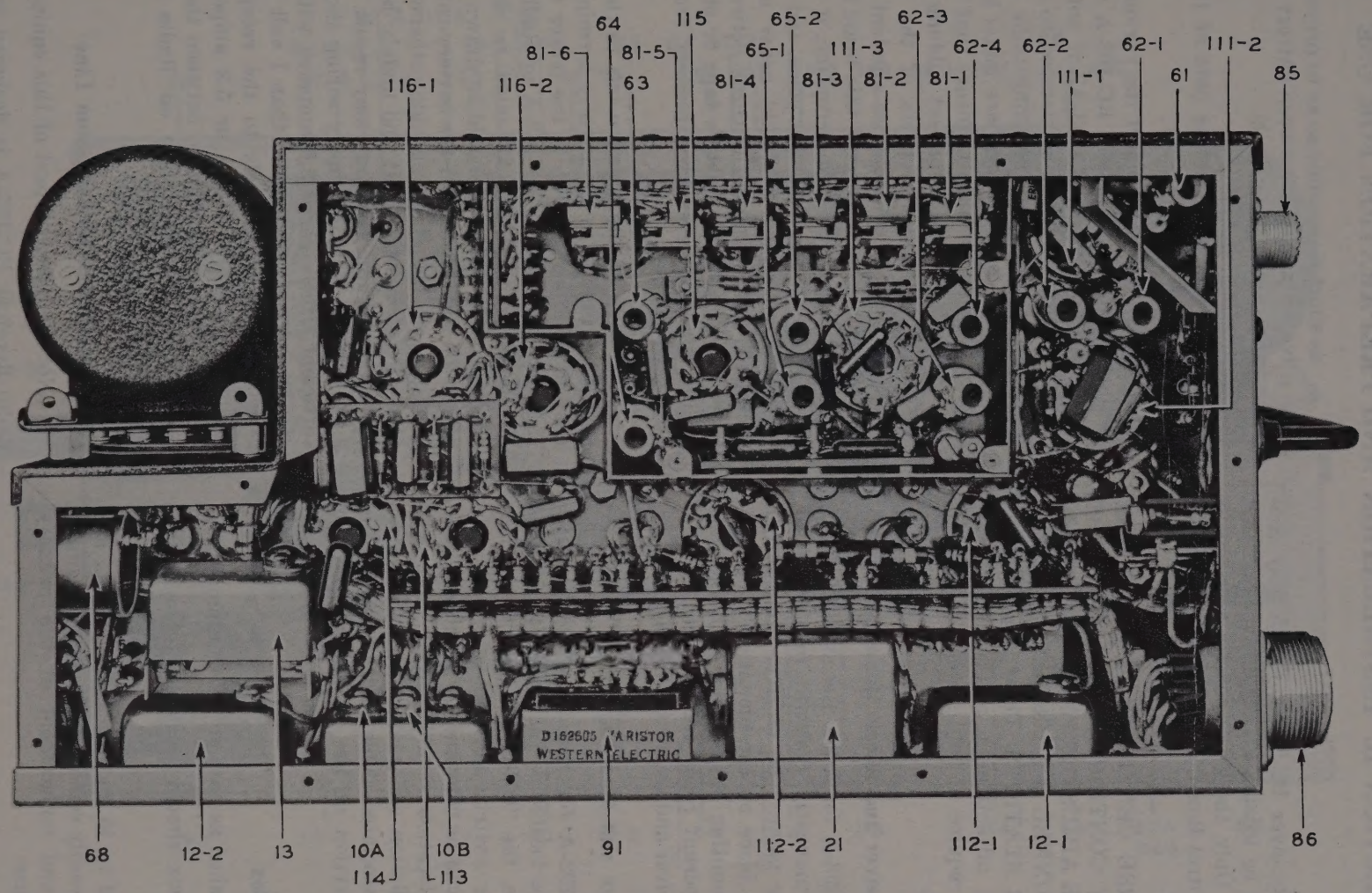


Figure 3 — RADIO RECEIVER BC-733-A, LEFT SIDE, COVER REMOVED.

SECTION II. INSTALLATION AND PREPARATION FOR USE

9. General

Since Radio Receiver BC-733-A is remotely controlled, it can be located at any convenient part of the plane. Only the cross-pointer instrument and Radio Control Box BC-732-A need be located near the pilot.

THE COURSE CENTERING AND COURSE SENSITIVITY CONTROLS SHOULD NOT BE CHANGED OR ADJUSTED EXCEPT BY QUALIFIED PERSONNEL AT PROPERLY EQUIPPED REPAIR STATIONS. These are primarily manufacturing adjustments, and with ordinary usage should require no adjustment during the life of the set.

10. Radio Receiver and Shock Mounting

Mounting FT-293-A for Radio Receiver BC-733-A should be permanently fastened in the chosen location in the plane. The receiver should then be fastened in place on the mounting. The location of the mounting should allow for adequate clearances to permit ready removal and installation of the receiver and associated cords and plugs.

11. Control Box and Mounting

Mounting FT-292-A for Radio Control Box BC-732-A should be located so that when the control box is in place, the "ON-OFF" switch, the frequency selector switch, and the volume control potentiometer can be conveniently reached by the operator. The location should provide clearances for easy installation and removal of the control box and its associated cable and plug, and for convenient insertion of the headphone plug in jack 201.

12. Junction Box

(Not furnished as part of this equipment.)

The junction box should meet the following requirements:

a. It should be in an accessible location, and have a readily removable cover to facilitate testing and replacement of the primary power fuse.

b. Its location with respect to Radio Receiver BC-733-A, Radio Control Box BC-732-A, and the airplane battery should be such as to make the total length of battery cables as short as possible so as to prevent excessive voltage drop between battery terminals and receiver terminals.

13. Cords (Not furnished as part of this equipment)

The cords which interconnect the various units of Radio Receiving Equipment RC-103-A and Radio Receiving Equipment RC-103-AZ if not in metal conduit should be lashed or clamped to structural members of the aeroplane along their length. If the cords are covered with bare metal braid, precautions should be taken to insure that this braid does not come into intermittent rubbing or touching contact with metal parts of the aeroplane structure, as such contacts are a potent source of troublesome noise. Wherever this braid is close to the metal structure of the aeroplane, it should be securely clamped or bonded in place, and the intervals between supports should never exceed 18 inches. The portions of the cords between bonds may be covered with friction tape or other insulating material to insure freedom from intermittent contacts.

The cord from the junction box to the battery should go directly to the battery terminals, or as near to them as possible. If the power for Radio Receiving Equipment RC-103-A or Radio Receiving Equipment RC-103-AZ must be drawn off another power cable, it should be drawn off from a cable on the load side of the battery rather than from one on the charging side, otherwise noise from the charging circuit and unduly large fluctuations in primary voltage may result. The conductors in the primary supply wiring should be of sufficient size to carry 2.6 amperes with a total drop in voltage of not more than 1 volt from the 24 volt battery terminals to the receptacle on Radio Receiver BC-733-A, or 5.2 amperes with not more than 0.5 volt drop between the 12 volt battery and the receptacle on Radio Receiver BC-733-AZ.

14. Antenna and Transmission Line

(Not furnished as part of this equipment.)

Radio Receiver BC-733-A is designed to operate from a balanced transmission line. An antenna for the reception of horizontally polarized signals as used for localizer and range operation will furnish the signals for this equipment. The same precau-

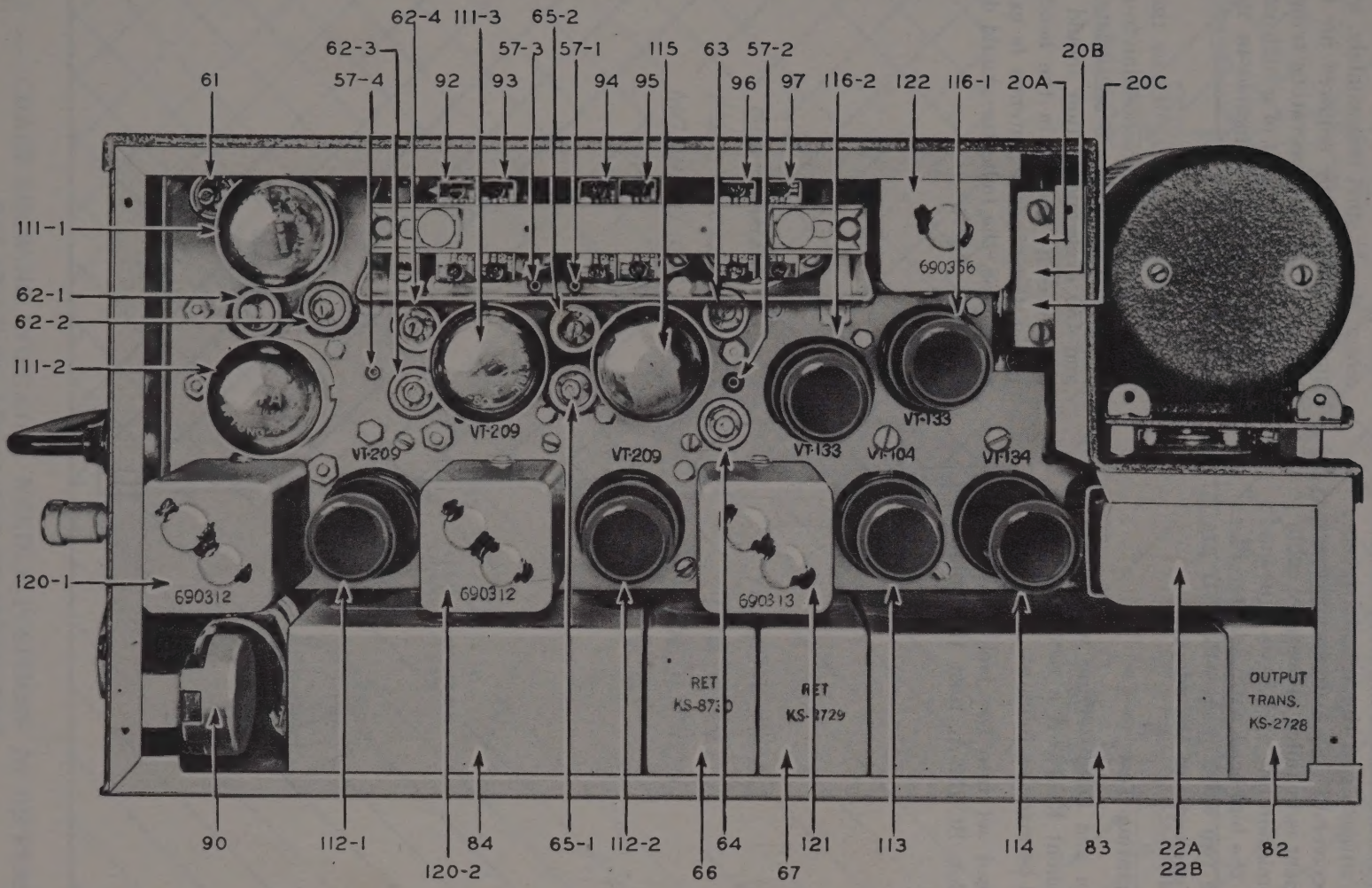


Figure 4 — RADIO RECEIVER BC-733-A, RIGHT SIDE, COVER REMOVED.

tions governing installation of the interconnecting cords apply to the installation of the transmission line between the antenna and the antenna receptacle of Radio Receiver BC-733-A. In special cases where the equipment is installed in pressure cabin planes, the transmission line may have to be cut, and put through the bulkhead with Adapter PL-285. In this case two extra plugs (PL-284) are required, one on each end of the adapter.

15. Receiver Operating Test

After installation and before flying with Radio Receiving Equipment RC-103-A a receiver operating test should be made as follows:

a. Plug a head set into the jack on Radio Control Box BC-732-A, turn the volume control knob to about mid-scale, and turn the "ON-OFF" switch to "ON". The dynamotor should start immediately, and after an interval of time required for the tube cathodes to reach operating temperature, a noise, characteristic of a high gain radio receiver, should be audible in the headphones.

b. Operate the selector switch on the control box to the letter corresponding to a nearby localizer transmitter, if one exists. The 90 and 150 cycle modulation should immediately become audible in the headset, and unless the airplane antenna is exactly on the course, the indicator should deflect to the right or left.

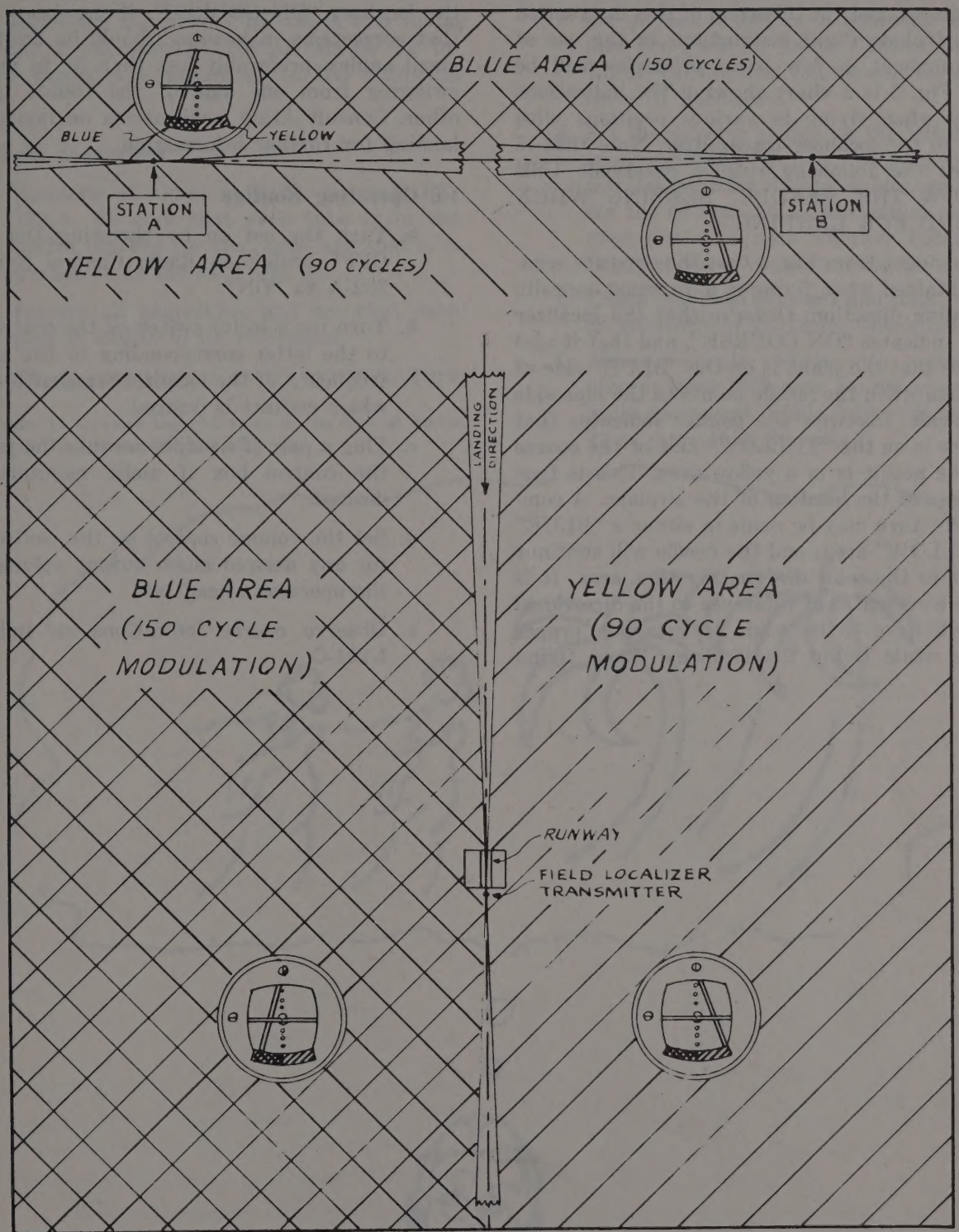


Figure 5 — CHART SHOWING INDICATOR NEEDLE POSITIONS IN DIFFERENT AREAS RELATIVE TO LOCALIZER TRANSMITTER.

SECTION III. OPERATION

Although it is not the intention of this instruction book to include flight instructions in the use of this equipment, a few basic principles will be stated. Fig. 5 is a chart showing the indications received when flying in various positions with respect to the localizer transmitter. Note that in all cases the following rule is observed: USE "FOLLOW THE NEEDLE" SENSING WHEN INBOUND FOR LANDING.

It is evident from Fig. 5 that the opposite sensing is obtained when flying in a direction opposite the landing direction. Observe that the localizer pointer indicates "ON COURSE", and that it also indicates that the plane is on the "BLUE" side of the course when the needle points to the blue side of the scale. Likewise the pointer indicates that the plane is on the "YELLOW" side of the course when the needle is in a yellow area. This is true regardless of the heading of the airplane. A complete 360° turn may be made in either a "BLUE" or "YELLOW" area; and the needle will continue to point to the color designating that area. It is therefore evident that reference to the directional gyro will have to be made to establish proper heading while flying the localizer. When flying the localizer "ON COURSE", it has been found that corrections in heading should be limited to small angles, preferably less than 5° to prevent swinging from one side of the course to the other. Consult Army publications on instrument landing for further information.

16. Operating Routine

a. Turn the set on by throwing the "ON-OFF" switch on Radio Control Box BC-732-A to "ON".

b. Turn the selector switch on the control box to the letter corresponding to the carrier frequency of the localizer transmitter with which contact is desired.

c. Plug a pair of headphones into the jack on the control box if audio monitoring is desired.

d. Set the volume control on the control box for any desired audio output volume into the operator's head set.

e. Observe course indications on Indicator I-101-C.

SECTION IV. MAINTENANCE

Radio Receiving Equipment RC-103-A and Radio Receiving Equipment RC-103-AZ should be inspected periodically according to the following routine:

17. Flight Inspection

a. Examine all tubes in Radio Receiver BC-733-A. Be sure that each tube is in the socket marked for that type and that it is pushed in as far as it will go.

b. Inspect all snapslides, and see that each plug is locked in its receptacle.

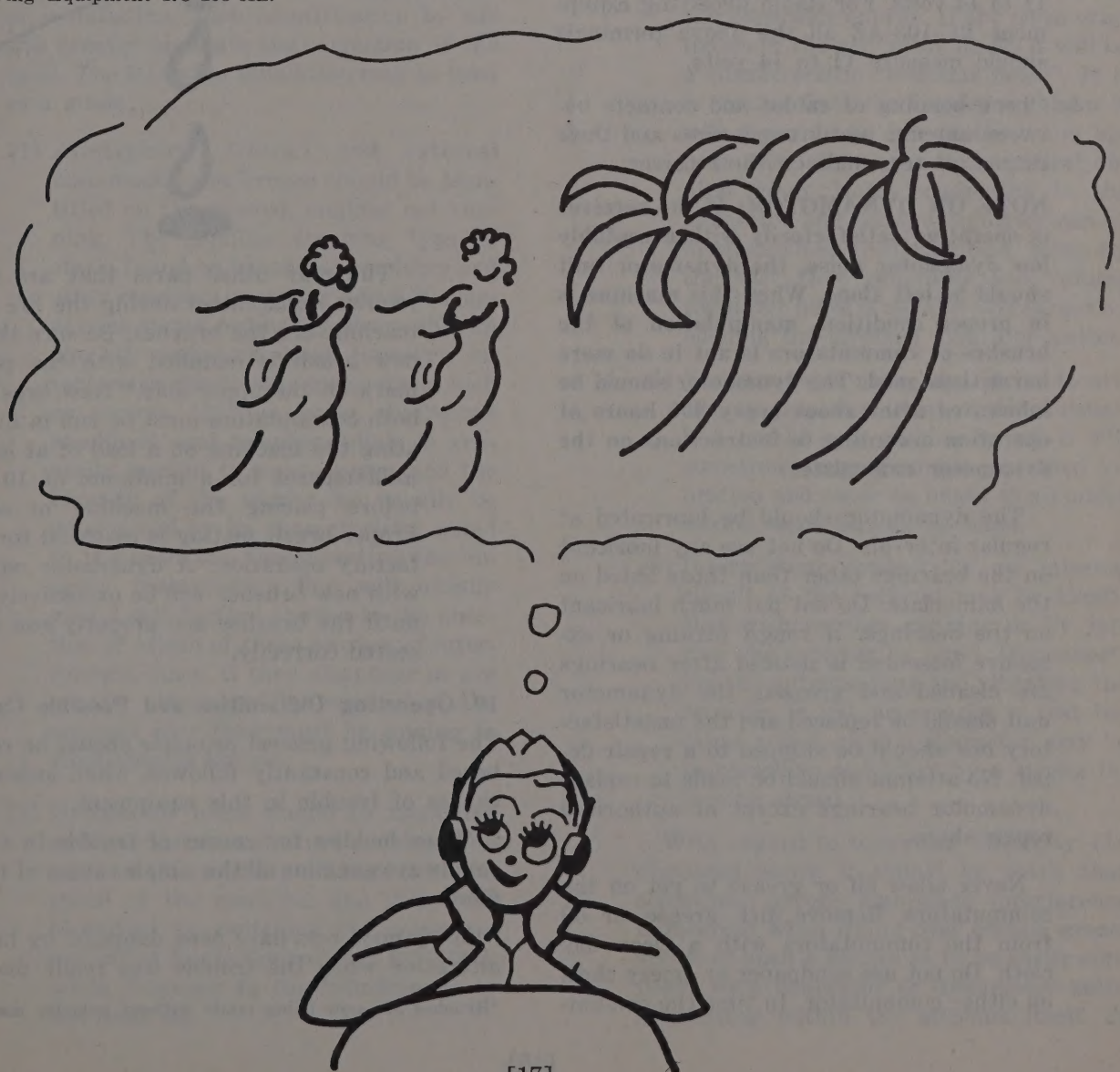
c. Check operation of switch controls. Turn set on and listen in headphones plugged into the jack on Radio Control Box BC-732-A, turning the volume control to maximum if necessary.

d. Set the selector switch on the letter corresponding to the frequency of a nearby localizer transmitter, if one exists, and listen for the 90 and 150 cycle modulation in the head set. Also note whether Indicator I-101-C shows a course indication or not.

e. Check the head set cord and plug for open or intermittent contacts. Check head sets.

f. Measure supply voltage with engines running at least 1500 rpm. Do not operate the radio equipment if this voltage is less than 22 or more than 30 volts.*

*Less than 11 or more than 15 volts in the case of Radio Receiving Equipment RC-103-AZ.



NOTE: Never operate the radio equipment on the ground longer than is necessary to complete this inspection. Never leave the airplane without turning the switch on Radio Control Box BC-732-A to "OFF".

18. Service Inspection

a. Using a high resistance voltmeter, measure voltages to ground of terminals H or C, and I to N inclusive in the junction box. Satisfactory operation of this equipment requires that these voltages be within about 10 percent of their rated voltages, as follows: for Radio Receiving Equipment RC-103-A all the above terminals should measure 22 to 28 volts except the terminal in group I to N corresponding to the operated crystal relay. This terminal should measure 11 to 14 volts. For Radio Receiving Equipment RC-103-AZ all the above terminals should measure 11 to 14 volts.

b. Check bonding of cables and contacts between antenna and ground wires and their respective terminals on the receiver.

NOTE ON DYNAMOTOR: If the receiver is operating satisfactorily with acceptably low dynamotor noise, the dynamotor unit should be left alone. When this machine is in proper condition, manipulation of the brushes or commutators is apt to do more harm than good. The dynamotor should be lubricated after about every 300 hours of operation according to instructions on the dynamotor nameplate.

The dynamotor should be lubricated at regular intervals. Do not use any lubricant on the bearings other than those listed on the nameplate. Do not put much lubricant on the bearings. If rough turning or excessive looseness is noticed after bearings are cleaned and greased, the dynamotor unit should be replaced and the unsatisfactory one should be shipped to a repair depot. No attempt should be made to replace dynamotor bearings except at authorized repair shops.

Never allow oil or grease to get on the commutators. Remove dirt, grease, or oil from the commutators with a clean dry cloth. Do not use sandpaper or emery cloth on either commutator. In time the commutators will be covered with a dark or semi-transparent film which is not a cause of noise and should not be removed.

The only other parts that are apt to require replacement during the life of the machine are the brushes. Be sure that the new brush is installed with the polarity mark on the upper side.* New brushes on both commutators must be run in by operating the machine on a load of at least 50 milliamperes for a minimum of 10 hours before placing the machine in service. Proper brush seating is essential for satisfactory operation. A dynamotor equipped with new brushes will be excessively noisy until the brushes are properly run in and seated correctly.

19. Operating Difficulties and Possible Causes

The following general principle should be remembered and constantly followed when looking for causes of trouble in this equipment.

When looking for causes of trouble in a radio set always examine all the simple causes of trouble first.

Many good sets have been damaged by internal alteration when the trouble was really due to a

*Brushes are now being made without polarity marks.

faulty cable, plug, power supply, or a tube. This radio equipment is electrically a rather complicated system, dependent upon precise design, workmanship, and adjustment for proper operation. Inspections and operations performed on the interior of this equipment, which are described in the following paragraphs, should be done as a last resort, and only after it is certain that the fault is not to be found outside the set inclosures.

a. *Receiver Operative but Noisy*

Probably the most common cause of poor radio reception in all airplane installations of high sensitivity receivers is electrical disturbances of both local and atmospheric origin. Operators should learn by experience to identify those "noises" in the head sets which indicate faults in the apparatus or installation. Such identification by ear will greatly facilitate the correction of the fault. The following tabulation may be used as a guide:

(1) Atmospheric (static) and external man-made interference should be identified on the ground, engines not running. The familiar crashing type of static found on broadcast receivers and other receivers operating below 20 megacycles is not ordinarily observable on the 110 megacycle band. However, interference due to man-made static such as corona, ignition noise, diathermy machines, and telephone dials is generally present to some degree, and the identity of the source can usually be determined by its characteristic sound in the head set. Disconnecting the antenna transmission line will usually give a satisfactory answer to the question of origin of these sources of interference, since, if they disappear or are greatly attenuated by removal of the antenna plug they must be coming in from outside the set.

(2) Dynamotor noise should be identified on the ground, engine not running; the pitch of this sound is a function of the speed of the machine, and it can be identified by switching the power on and off at Radio Control Box BC-732-A while listening to the interference in the head set.

(3) Intermittent contact in phone cord, plug, or contacts in the head set should be identified on the ground, engines not running. Sometimes it can be located by jiggling the cord.

(4) Loose bond or terminal plug on any of the set cables should be identified on the ground, engine not running, using the same method as in (3).

(5) Ignition noise should be identified on the ground, and should appear immediately on starting the engines. Trouble source can be localized further by switching between magnetos.

(6) Generator noise should be identified on ground with the engines running, by advancing throttle to the point where the generator cuts in. If the noise originates in the generator itself, it will be a characteristic "machine noise". If it is coming from the voltage regulator it will probably be intermittent and appear only above a certain critical engine speed. Noise originating in the generator and voltage regulator can be distinguished from ignition noise by the fact that generator and voltage regulator noise is usually suppressed by opening the airplane main line switch.

(7) Vacuum tube noise should be identified on ground, engines running; usually a cracking or ringing sound. It will sometimes appear under sustained vibration and never be heard at all under intermittent jarring by hand.

(8) Intermittent contact in an internal circuit of the receiver may be identified with engines running or by jarring the receiver by hand. Disconnecting the antenna plug and vibrating the receiver is not necessarily a test because noises of this character may be increased to audibility by a strong incoming signal.

With regard to operating difficulty (1) discussed above it should be noted that sometimes severe man-made interference is received when flying over certain areas, and is of such a nature as to be easily confused with generator or dynamotor noise originating within the airplane itself. If

"machine" noises are suddenly noticed during a flight, they may possibly be identified with a particular ground area. It should also be remembered that when flying through mist, rain or snow, a noise is sometimes heard resembling "machine" noise in character but actually produced by the impact of charged particles on the receiving antenna and airplane. This effect is irremediable, but is minimized where electrostatically-shielded equipment is employed.

With regard to (2) above, the interruption of current in the commutators of the dynamotor machine sets up radio frequency oscillations in the connecting cables. These oscillations enter the receiver by way of the antenna, never by the cord conductors. The magnitude of this noise is an inverse function of the efficiency of cord bonding. A dirty commutator will produce more noise than a clean one, but the best possible suppression cannot be realized unless all conductor and antenna shielding is thoroughly bonded and grounded. This fact should be borne in mind when making bench installations of the receiver for test purposes. When this noise occurs in an airplane installation the bonding of all cords and the antenna shield to the airplane should be checked for poor contacts. If the noise persists, the commutators of the dynamotor may be cleaned with a clean dry cloth while the machine is running. A trace of oil or grease may cause more trouble than any dirt deposit. The low voltage commutator is more apt to produce noise than is the high voltage commutator. Under normal operating conditions, the commutators of these enclosed machines should give satisfactory service for 1000 hours before requiring cleaning.

With regard to (6), generator and voltage regulator noise is frequently a more elusive fault than ignition noise. A temporary remedy, if the generator becomes noisy in the air, is to open its field while receiving, but this is not a cure, and should not be permanently tolerated. Complete shielding will not always cure regulator interference. For best results, the voltage regulator output should be electrically filtered. A method which is often effective is to connect a condenser of 0.5 mf between the positive generator field terminal and ground. To be effective this must be done at the generator, using the shortest possible leads.

With regard to (7), an intermittent contact inside a tube is sometimes the first indication that its useful life is over. Noises originating in the tubes are greatly accentuated by the presence of a strong radio signal, and this circumstance may be used as a means of identifying such a noise. The faulty tube must be located by substitution.

If the trouble is due to (8), the receiver must be dismounted and inspected internally for loose connections. To expose the receiver wiring compartment, remove the left side cover, looking at the receiver from the front end. Take care not to disturb the arrangement of the wiring during this inspection. The point-to-point resistance values given in Table 2 will be found useful in this check.

Operating the receiver at excessively high voltages tends to make it noisy and to increase the residual causes of noise. Never allow the set to be operated at a supply voltage higher than 30 volts.* Operation at less than its lower rated voltage will not damage the equipment, but the operation may be unsatisfactory.

b. *Receiver Dead—No Sounds*

Check all plugs and cords using the continuity data given in Table 3. Check the voltages at the terminals in the junction box listed in item 3 under the heading "Service Inspection". Inspect the junction box wiring for open circuits. If tubes do not light** and the dynamotor does not start when the switch on Radio Control Box BC-732-A is turned to "ON" check the fuse in the junction box. If tubes light but dynamotor does not run, look for an open circuit at the low voltage brushes. If all seems normal up to this point, check the volume control in Radio Control Box BC-

*In the case of Radio Receiving Equipment RC-103-AZ the upper safe limit is 15 volts.

**The VT-269 heaters are visible through the louvres in the tube compartment cover on the right hand side of the receiver.

732-A for an open or short. If the volume control circuit is normal and the receiver is still inoperative, the receiver should be removed from the plane and set up for a bench test.

Remove the wiring compartment cover from the left side of the receiver and inspect the wiring for open or short circuits. Remove the oscillator compartment cover and check that the relays are operating under control of the selector switch on the control box, and that the contacts are clean and close properly when the relays operate.

WARNING — Great care should be exercised when working in the wiring and oscillator compartments, as disturbance of some of the exposed wires may throw the alignment off enough to make the set relatively insensitive on some of the resonant frequencies.

Inspect all tube socket pins and at the various circuit terminations. Compare the tube socket pin voltages with those given in Tables 4 and 5 and the circuit termination voltages with those shown on Fig. 15. Any large discrepancies should be corrected before proceeding further. If there is no plate voltage on one vacuum tube, for example, trace the circuit back through decoupling resistance, checking by-pass condensers for shorts, to a point in the circuit where normal voltage is encountered. If all voltages are normal and the set is still inoperative, replace all vacuum tubes with new ones of the same types, as a tube may appear perfectly normal and still have lost all emission.

c. *Receiver Operative but Insensitive*

Check junction box primary voltages as described under heading "Service Inspection". Dead batteries are a frequent cause of communication failures. If voltages are normal, check tubes by replacement one at a time, noting any change in sensitivity as tubes are replaced. Check volume control circuit through Radio Control Box BC-732-A.

As a last resort, check the receiver alignment. This operation cannot be performed in the airplane but must be performed where bench test measuring equipment is available. A suggested procedure for checking the receiver alignment is given in detail in the Appendix.

d. *Receiver Oscillates*

The presence of sustained oscillations in the receiver (other than those due to the oscillator and harmonic generator) may be identified by (1) a beat note with incoming signals or (2) an increase in all noise levels. This condition may not render the receiver entirely useless since on strong signals, the gain reduction due to avc action may stop the spurious oscillations. However, this receiver is normally very stable, and any sustained oscillations are indicative of a trouble condition.

Check the grounding of the receiver. Open the tube compartment and change the r-f and first detector tubes 111-1 and 111-2, as an occasional tube with an imperfect internal shield may be encountered. As a last resort, remove the receiver from the plane and set it up on a test bench. Remove the wiring compartment cover and examine the receiver for loose ground lugs, faulty by-pass condensers, broken wires connecting tube shields to the chassis, or faulty resistances.

e. *Receiver Normal Through Aural Channel But Cross-Pointer Instrument Does Not Work*

The visual channel amplifier tube 116-2 input circuit is connected in parallel with that of the audio channel amplifier tube 114 so that failure of any component of the visual output channel might not cause any apparent change in receiver performance as judged by the operation of the audio output channel.

Check wiring from terminals D and E on Plug PL-Q254 through the connections in the junction box to terminals A and B respectively in Plug PL-P257, for open or short circuits. Open the tube compartment and replace tube 116-2. Replace Indicator I-101-C. If none of these expedients clears the trouble, the receiver will have to be removed from the airplane and set upon a test bench for examination of the circuit components accessible only through the wiring compartment. Remove the left side cover exposing the wiring and inspect the

wiring, resistances, potentiometers, condensers and choke components of the visual channel for open or short circuits. The units involved are listed below.

(1) Condensers 10A, 21, and 12-2.

(2) Resistors 44-2, 56, 33-1, 46-1, 46-2, 47-1, 47-2, 48-1 and 48-2.

(3) Potentiometers 89 and 90.

(4) Choke 66.

If the circuit components just listed all check as perfect and adequate testing facilities are not available, it will be necessary to make a substitution test on filter units 83 and 84, and "Varistor" (copper oxide rectifier-special) 91. If an audio oscillator such as the Hewlett-Packard model 200 B, a milliammeter such as the Weston model 622 having at least a 3 milliampere scale and an 800 ohm IRC BT ½ resistor are available the following tests should be made to determine which component has failed: Connect the milliammeter in series with the resistance across terminals D and E of receptacle 86 (socket for Plug PL-Q254) with the positive terminal of the meter toward D and set the sensitivity control for 3 milliamperes full scale. Connect the audio oscillator output between chassis ground and junction of resistor 44-2 and condenser 10A, tune it to 90 cycles, and set the output control at half scale. Turn on the receiver primary power and after allowing time for the tubes to warm up a deflection in the meter would occur if the visual channel were functioning properly. If none occurs reverse the meter connections, and retune the oscillator to 150 cycles. If no deflection occurs, the chances are that the "Varistor" (copper oxide rectifier-special) is defective. Replace it and repeat the tests just described.

If a deflection occurs in the first of the two tests above, but not in the second, replace the 150 cycle transformer band-pass filter 84. If a deflection occurs in the second test but not in the first, replace the 90 cycle transformer band-pass filter 83.

SECTION V. PROCEDURE FOR ALIGNING RADIO RECEIVER BC-733-A

20. General

Alignment of the tuned circuits of Radio Receiver BC-733-A involves the adjustment to rather close limits of three separate groups of band-pass filters, those in the r-f amplifier covering the band from 108.3 to 110.3 megacycles; those in the i-f amplifier having a mid-band frequency of 6900.000 kilocycles and being 6 db down at about 130 kilocycles band width; and those of the harmonic generator circuit covering bands of harmonics of frequencies varying from 5633.333 to 5744.444 kilocycles. Disturbance of the alignment of any of these circuits would tend to affect the receiver sensitivity. Slight disturbance of the r-f or harmonic generator tuned circuits may make the set insensitive at only one or two of the resonant frequencies, a circumstance which exonerates the i-f amplifier tuned circuits when misalignment is suspected.

Loss of activity of a crystal can also cause a loss in receiver sensitivity when that crystal is controlling the heterodyne oscillator. Before disturbing the set alignment it would be well to try substituting a new crystal for any which are found to be associated with low sensitivity when the set sensitivity is found to be normal at some other settings of the selector switch on Radio Control Box BC-732-A*. Also, always take the added precaution of ascertaining whether or not the crystal relay contacts involved are properly touching, since resistance in the relay contacts would lower the effective "Q" of the oscillator grid circuit.

Finally, before proceeding with any disturbance of the settings of the tuning slugs in any of the tuned circuits make sure that the trouble is not due to some readily corrected fault such as a loose wire from a tuning condenser to an inductance or a broken or damaged condenser shell, or to a short between turns of one of the bare wire wound coils.

21. Alignment of I-F Amplifier Tuned Circuits

This operation will require the following items:

a. Crystal of the same type as used in the receiver but adjusted to 6900 kilocycles ± 0.025 percent.

b. Weston model 622 or equivalent milliammeter having ranges of 30, 3, 0.3, and 0.03 milliamperes.

c. Erie Ceramicon type N or equivalent 5 mmf condenser provided with insulated clip leads.

d. Tuning shunt consisting of a 1000 ohm IRC type BT ½ resistor or equivalent and a 0.006 mf condenser Cornell-Dubilier type 1W or equivalent, connected in series and provided with insulated clips at the free ends of their leads.

Connect the Weston milliammeter across resistor 57-1 with the positive terminal at the ground end of the resistor. Disconnect condenser 14 from the plate end of inductor 63. Insert the 6900 kilocycle crystal in place of crystal 92 and set the selector switch on the control box at "U". Connect the 5 mmf condenser from the plate end of inductor 63 to the junction of resistor 57.4 and 34-1. Now turn the set on and after the tubes have warmed up, a substantial reading should be obtained on the meter, for example, 60 microamperes. If necessary, adjust the tuning slug in inductor 63 to obtain this reading.

Turn the set off, and disconnect one end of resistor 39-1 from the terminal strapped to the cathode of vacuum tube 113. Remove the milliammeter from its position across resistor 57-1 and connect it between the terminal just mentioned and the free end of resistor 39-1 with the positive terminal of the meter toward the terminal just vacated by the resistor. Turn the set on again and after allowing time for the tubes to warm up check the alignment of the i-f amplifier by proceeding as follows:

(1) Apply the tuning shunt across terminals 4 and 6 of coil 70-3, and adjust the tuning slug in coil 69-3 for maximum reading of the meter.

(2) Remove the tuning shunt, connect it from terminal 1 to ground on coil 69-3, and adjust the tuning slug in coil 70-3 for maximum reading of the meter.

(3) Next connect the tuning shunt from terminal 4 to ground on coil 70-2, and

*When type FT-243 crystals are inserted make sure the metal plate on the side of the crystal holder faces toward front of receiver, otherwise the crystal activity will be abnormally low.

adjust the tuning slug in coil 69-2 for maximum reading of the meter. Remove the tuning shunt, connect it from terminal 1 to ground on coil 69-2 and adjust the tuning slug in coil 70-2 for maximum reading of the meter.

(4) Repeat the procedure just described with coils 70-1 and 69-1. The i-f amplifier should now be in perfect alignment. Turn the set off. Remove the meter, reconnect resistor 39-1 to its original terminal, reconnect condenser 14 to the plate end of inductor 63 and replace crystal 92. Reconnect the meter across resistor 57-1, again with the positive terminal toward ground. Set the selector switch on the control box on "Z" and adjust the tuning slug in inductor 63 for maximum meter deflection, then back off until the meter reads 0.8 maximum. The oscillator is now in its original condition.

22. Alignment of Oscillator and Harmonic Generator Tuned Circuits

The vacuum tubes in the oscillator and harmonic generator circuit are biased only by voltages developed in grid resistors resulting from the diode rectifying action of the grids on the currents from the oscillator and its harmonics. Since these voltages are proportional in magnitude to the grid currents flowing in the tubes, it serves as a convenient means of determining the adjustment of the tuning slugs in the tuned circuits.

Alignment of these tuned circuits requires the following items:

a. Weston model 622 or equivalent milliammeter having ranges of 30, 3, 0.3, and 0.03 milliamperes.

b. Tuning shunt consisting of a 1000 ohm IRC type BT ½ resistor or equivalent and a Cornell-Dubilier type 1W or equivalent 0.006 mf condenser, connected in series and provided with insulated clips at the ends of their free leads.

The alignment procedure is as follows:

Connect the milliammeter across resistor 57-1 with the positive terminal toward ground. Set the selector switch on Radio Control Box BC-732-A on "Z" and adjust the slug in coil 63 for maximum deflection of the meter. Having observed the maximum current, turn the slug counter-clockwise until the indicated current is about 80 percent of the maximum. This final current should be at least 100 microamperes.

Now connect the meter across resistor 57-2, again with the positive terminal toward ground. Set the selector switch on Radio Control Box BC-732-A on "V". Adjust the tuning slug in coil 64 for maximum deflection of the meter. This deflection should be at least 80 microamperes.

Connect the meter across resistor 57-3, and connect the tuning shunt from the grid end of coil 65-2 to ground. Set the selector switch on Radio Control Box BC-732-A on "X". Adjust the tuning slug in coil 65-1 for maximum deflection of the meter. Transfer one end of the tuning shunt from the grid end of coil 65-2 to the plate end of coil 65-1 leaving the other end of the shunt at ground. Adjust the tuning shunt in coil 65-2 for maximum deflection of the meter. Remove the tuning shunt after this adjustment and observe the meter current. It should be at least 50 microamperes.

Connect the meter across resistor 57-4, with the positive terminal at ground. Set the selector switch on the control box at "U" and adjust the tuning slugs in coils 62-3 and 62-4 for maximum current in the meter. Reset the selector switch on the control box to "Z" and observe the current through the meter, comparing it with that observed when the selector switch was in position "U". If the two observations differ by more than 0.25 of the larger of the two, readjust the tuning slugs in coils 62-3 and 62-4 to minimize it, switching alternately between positions "U" and "Z" on control box.

When the above adjustments are complete, operate the selector switch through its six positions and observe the current in the meter connected across 57-4 at each position. This current at any position of the selector switch should be at least 25 microamperes.

NOTE: The alignment of the final stage of the harmonic generator is not entirely independent of the adjustment of the grid coil 62-2 in the first

detector input circuit. If this coil is out of adjustment it may not be possible to adjust coils 62-3 and 62-4 properly. In such a case, simply adjust these two coils for any convenient reading of the meter across resistor 57-4 with the selector switch on the control box in position "X" and defer final adjustment of the harmonic generator output stage until after alignment of the r-f amplifier.

23. Alignment of R-F Amplifier Tuned Circuits

This procedure will require the following items:

a. Signal Generator covering the ranges around 110 mc.

b. Power output meter equipped with a cord and plug to fit the phone jack on Radio Control Box BC-732-A.

Connect the output terminals of the signal generator between chassis ground and either terminal of receptacle 85 on the receiver. Plug the output meter into the phone jack on the control box. Set the modulation switch on the signal generator at 1000 cycles. Set the output meter for 4000 ohms, and turn the volume control on the control box to maximum.

Set the selector switch on Radio Control Box BC-732-A at "U" and tune the signal generator to 108.3 megacycles. Adjust the r-f output attenuator to produce an audio output of 50 milliwatts of 1000 cycles in the output power meter. Adjust the tuning slugs in coils 62-1 and 62-2 for maximum deflection of the output meter, reducing the r-f input, if necessary, to insure that the output never exceeds 100 milliwatts, thereby keeping the signal level well below the automatic volume control threshold.

Next, set the selector switch on the control box at "X" and tune the signal generator to 109.5 megacycles. Adjust the r-f output attenuator to produce an audio output of 50 milliwatts in the output power meter. Adjust the tuning slug in coil 61 for a maximum reading of the output power meter, again reducing the r-f input to the receiver, if necessary, to keep below the avc threshold.

For the final adjustment, set the selector switch on the control box and tune the signal generator alternately to "Z", 110.3 megacycles and "U", 108.3 megacycles. Adjust the r-f output of the signal generator at each frequency to produce an audio power output from the receiver of 50 milliwatts. If the difference in the r-f input required for 50 milliwatts audio output at the two frequencies exceeds 3 db (1.4 to 1 in voltage ratio), readjust the tuning slug in coil 61 to make the difference as small as possible.

When realigning the r-f amplifier tuned circuits as just described, always check that the adjustment of the final stage of the harmonic generator, consisting of coils 62-3 and 62-4, is still correct. This operation is performed according to the instructions given above under the heading "Alignment of Oscillator and Harmonic Generator Tuned Circuits."

SECTION VI. ADJUSTMENT OF COURSE SENSITIVITY AND BALANCE CONTROLS

24. General

The course sensitivity and balance controls, consisting of potentiometers 89 and 90, are extremely stable and should not need readjustment during the life of the equipment unless it has been found necessary to replace some of the apparatus in the visual output channel of the receiver, in particular the transformer band-pass filter units 83 or 84, "Varistor" (copper oxide rectifier-special) 91 or resistors 47-1, 47-2, 48-1 or 48-2. Of course, replacement of either potentiometer 89 or 90 would necessitate adjustment of the new unit.

Since the elaborate 90 and 150 cycle test equipment used in the factory setting of the balance and sensitivity control potentiometers is not available in the field, readjustment of these controls requires utilization of the localizer transmitter signals and use of the runway.

25. Adjustment of Balance Control

Move the airplane so that the localizer receiving antenna is on the center line of the runway at the intended point of contact when landing. Remove the cover on the front of Radio Receiver BC-733-A case, loosen the locking nut on the balance control potentiometer 90, and adjust it so that the vertical pointer of Indicator I-101-C is on the center line. Tighten the locking nut on 90 after adjustment is completed.

26. Adjustment of Sensitivity Control

The sensitivity adjustment of potentiometer 89 on Radio Receiver BC-733-A is normally such that a full scale deflection of Indicator I-101-C will occur when the antenna of the localizer receiver is about 2.5 degrees to the right or left of the center line of the runway, and when the input signal level is not less than 20 nor more than 100,000 microvolts. The sensitivity can be made higher or lower by adjustment of potentiometer 89 after loosening the locking nut. When the desired setting has been made, the locking nut should be re-tightened.

After adjustment of potentiometers 89 and 90 is completed, replace the cover on the front of the receiver case.

SECTION VII. APPENDIX

27. TABLE 2. Point-to-Point Resistance Values for Radio Receiver BC-733-A Measured from the Designated Terminal to Ground. Receiver Disconnected from Cables. See Fig. 7.

Designated Terminal	Reference Number	Ohmmeter Scale	Resistance Ohms Including Limits	Probable Cause of Incorrect Reading
Top	61	0—1000	1.0 max.	Open Circuit.
1	100-1	0—1000	1.0 max.	Open Circuit.
2	100-1	0—1000	(14 V) (28 V) 2.5 or 3.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
3	100-1	0—1000	1.0 max.	Open Circuit.
4	100-1	0—1,000,000	1,170,000—1,450,000	Open Circuit. Shorted Condenser 2, 4-5, 25-2, 25-4, or 13. Defective Vacuum Tube 111-1.
5	100-1	0—1000	1.0 max.	Open Circuit.
6	100-1	0—1,000,000	75,850—93,350	Open Circuit. Defective Dynamotor. Shorted Condenser 3-1. Defective Vacuum Tube 111-1.
7	100-1	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	100-1	0—100,000	2050—2550	Open Circuit. Shorted Condenser 1-2, or 4-1. Defective Vacuum Tube 111-1.
Top	62-2	0—1000	1.0 max.	Open Circuit.
1	100-2	0—1000	1.0 max.	Open Circuit.
2	100-2	0—1000	1.0 max.	Open Circuit.
3	100-2	0—10,000	198—242	Open Circuit. Shorted Condenser 4-2 or 7-1. Defective Vacuum Tube 111-2.
4	100-2	0—1,000,000	199,200—243,800	Open Circuit. Shorted Condenser 5. Defective Vacuum Tube 111-2.
5	100-2	0—10,000	198—242	Open Circuit. Shorted Condenser 4-2 or 7-1. Defective Vacuum Tube 111-2.
6	100-2	0—1,000,000	26,250—32,250	Open Circuit. Shorted Condenser 4-3. Defective Vacuum Tube 111-2.

Designated Terminal	Reference Number	Ohmmeter Scale	Resistance Ohms Including Limits	Probable Cause of Incorrect Reading
7	100-2	0—1000	(14 V) (28 V) 2.5 or 3.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3 or 8-5.
8	100-2	0—100,000	2950—3650	Open Circuit. Shorted Condenser 25-1. Defective Vacuum Tube 111-2.
1	101-1	0—1000	1.0 max.	Open Circuit.
2	101-1	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
3	101-1	0—1000	1.0 max.	Open Circuit.
4	101-1	0—1,000,000	1,096,920—1,340,680	Open Circuit. Shorted Condenser 25-2, 4-5, 13, 25-4, or 2. Defective Vacuum Tube 112-1.
5	101-1	0—1000	1.0 max.	Open Circuit.
6	101-1	0—1,000,000	35,350—46,400	Open Circuit. Shorted Condenser 8-1. Defective Vacuum Tube 112-1.
7	101-1	0—1000	(14 V) (28 V) 1.0 or 4.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	101-1	0—100,000	1150—2450	Open Circuit. Shorted Condenser 25-3. Defective Vacuum Tube 112-1.
1	101-2	0—1000	1.0 max.	Open Circuit.
2	101-2	0—1000	(28 V) (14 V) 2.5 or 1.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
3	101-2	0—1000	1.0 max.	Open Circuit.
4	101-2	0—1,000,000	1,096,920—1,340,680	Open Circuit. Shorted Condenser 25-4, 25-2, 2, 4, or 13. Defective Vacuum Tube 112-2.
5	101-2	0—1000	1.0 max.	Open Circuit.
6	101-2	0—1,000,000	35,350—46,400	Open Circuit. Shorted Condenser 8-2. Defective Vacuum Tube 112-2.
7	101-2	0—1000	(14 V) (28 V) 1.0 or 4.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	101-2	0—100,000	1150—1450	Open Circuit. Shorted Condenser 25-5. Defective Vacuum Tube 112-2.

Designated Terminal	Reference Number	Ohmmeter Scale	Resistance Ohms Including Limits	Probable Cause of Incorrect Reading
1	101-3	0—1,000,000	384,120—469,480	Defective Vacuum Tube 113. Shorted Condenser 4-4, 11, or 10A. Open Circuit.
2	101-3	0—1,000,000	2,850,120—3,503,480	Open Circuit. Shorted Condenser 7-2, 9-1, 9-2, 4-4, 11, or 10A. Defective Vacuum Tube 113.
3	101-3	0—1,000,000	384,120—469,480	Open Circuit. Shorted Condenser 4-4, 11, or 10A. Defective Vacuum Tube 113.
4	101-3	0—1,000,000	510,120—623,480	Open Circuit. Shorted Condenser 10B, 13, or 4-5. Defective Vacuum Tube 113.
5	101-3	0—1,000,000	870,120—1,033,400	Open Circuit. Shorted Condenser 7-2, 9-1, 9-2, 10A, 10B, 4-4, or 11. Defective Vacuum Tube 113.
6	101-3	0—10,000	435—595	Open Circuit. Shorted Condenser 3-4, 22A, 22B, or 23. Defective Vacuum Tube 113. Defective Vacuum Tube 114.
7	101-3	0—1000	1.0 max.	Open Circuit.
8	101-3	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
1	101-4	0—1000	1.0 max.	Open Circuit.
2	101-4	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
3	101-4	0—10,000	700—950	Open Circuit. Defective Transformer 82. Shorted Condenser 23, 3-4, 22A, or 22B. Defective Vacuum Tube 114.
4	101-4	0—10,000	435—595	Open Circuit. Shorted Condenser 3-4, 22A, 22B, or 23. Defective Vacuum Tube 114. Defective Vacuum Tube 113.
5	101-4	0—1,000,000	504,000—616,000	Open Circuit. Shorted Condenser 11. Defective Vacuum Tube 114.
6	101-4	0—1,000,000	Infinite	Blank Terminal.
7	101-4	0—1000	(14 V) (28 V) 1.0 or 4.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	101-4	0—100,000	900—1100	Open Circuit. Shorted Condenser 12-1. Defective Vacuum Tube 114.
1	101-5	0—1,000,000	199,200—243,800	Open Circuit. Shorted Condenser 26-1. Defective Vacuum Tube 115.

Designated Terminal	Reference Number	Ohmmeter Scale	Resistance Ohms Including Limits	Probable Cause of Incorrect Reading
2	101-5	0—1000	1.0 max.	Open Circuit.
3	101-5	0—100,000	9715—11,815	Open Circuit. Shorted Condenser 16-1, 8-13, 8-15, 8-4, 4-6, 3-1, 4-1, 4-3, or 25-1. Defective Vacuum Tube 115.
4	101-5	0—1000	1.0 max.	Open Circuit.
5	101-5	0—1,000,000	163,200—199,800	Open Circuit. Shorted Relay Circuit 81-1. Defective Vacuum Tube 115.
6	101-5	0—100,000	9715—11,815	Open Circuit. Shorted Condenser 16-1, 8-13, 8-15, 8-4, 4-1, 4-3, 4-6, 3-1, or 25-1. Defective Vacuum Tube 115.
7	101-5	0—1000	1.0 max.	Open Circuit.
8	101-5	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
1	101-6	0—1000	1.0 max.	Open Circuit.
2	101-6	0—1,000,000	50,400—61,600	Open Circuit. Defective Vacuum Tube 116-1. Shorted Condenser 8-14.
3	101-6	0—1000	1.0 max.	Open Circuit.
4	101-6	0—1,000,000	259,000—304,000	Open Circuit. Shorted Condenser 26-2, 20A, or 20B. Defective Vacuum Tube 116-1.
5	101-6	0—1,000,000	259,000—304,000	Open Circuit. Shorted Condenser 26-2, 20A, or 20B. Defective Vacuum Tube 116-1.
6	101-6	0—100,000	2415—3015	Open Circuit. Shorted Condenser 8-14, 26-2, 20C, 8-13, 22A, 22B, 3-4, or 23. Defective Vacuum Tube 116-1.
7	101-6	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	101-6	0—1000	(14 V) (28 V) 1.0 or 4.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
1	101-7	0—1000	1.0 max.	Open Circuit.
2	101-7	0—1,000,000	10,800—103,200	Open Circuit. Defective Vacuum Tube 116-2.
3	101-7	0—100,000	900—1100	Open Circuit. Shorted Condenser 12-2. Defective Vacuum Tube 116-2.
4	101-7	0—1000	1.0 max.	Open Circuit.

Designated Terminal	Reference Number	Ohmmeter Scale	Resistance Ohms Including Limits	Probable Cause of Incorrect Reading
5	101-7	0—1000	1.0 max.	Open Circuit.
6	101-7	0—100,000	3185—4195	Open Circuit. Defective Choke 66. Shorted Condenser 21, 20C, 22A, 22B, 3-4, or 23. Defective Vacuum Tube 116-2.
7	101-7	0—1000	(14 V) (28 V) 1.5 or 2.5 max.	Defective Resistor 49 or 50. Burned Out Heater. Shorted Condenser 3-2, 3-3, 7-3, or 8-5.
8	101-7	0—1000	1.0 max.	Open Circuit.
Terminal	85	0—1000	1.0 max.	Open Circuit in 61.
Terminal	85	0—1000	1.0 max.	Open Circuit in 61.
A	86	0—1000	1.0 max.	Open Circuit.
B	86	0—1,000,000	Infinite	Short Circuit.
C	86	0—1000	(14 V) (28 V) 1.5 or 36-49	Open Circuit. Defective Dynamotor Unit.
D	86	0—1,000,000	Infinite	Ground in 83, 84, or 91.
E	86	0—1,000,000	Infinite	Ground in 83, 84, or 91.
F	86	0—1000	45—70	Open Circuit. Defective Coil 82.
G	86	0—100,000	2180—2686	Open Circuit. Defective Coil 82.
H	86	0—1000	(14 V) (28 V) 36-45 or 4.5	Open Circuit. Defective Dynamotor Unit.
I	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.
J	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.
K	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.
L	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.
M	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.
N	86	0—1,000,000	Infinite	Shorted Condenser 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, or 8-12.

28. TABLE 3 — CONTINUITY TEST TABLES

Part 1. Test on cables from Plug PL-Q254 through junction box to Plug PL-P256 and Plug PL-P257. Battery disconnected and battery leads connected together. (See Fig. 14.)

From Plug and Terminal Designation	To Plug and Terminal Designation	Ohmmeter Scale	Resistance Ohms	Probable Cause of Incorrect Reading
PL-Q254-A	PL-P256-A	0-1,000	1.0	Open Circuit
A	D	0-1,000	1.0	Open Circuit
B	B	0-1,000,000	Infinite	Short Circuit
C or H*	H	0-1,000	1.0	Open Circuit
D	PL-P257-A	0-1,000	1.0	Open Circuit
E	B	0-1,000	1.0	Open Circuit
F or G**	PL-P256-G	0-1,000	1.0	Open Circuit
I	I	0-1,000	1.0	Open Circuit
J	J	0-1,000	1.0	Open Circuit
K	K	0-1,000	1.0	Open Circuit
L	L	0-1,000	1.0	Open Circuit
M	M	0-1,000	1.0	Open Circuit
N	N	0-1,000	1.0	Open Circuit

* Terminal C for Radio Receiving Equipment RC-103-A; Terminal H for Radio Receiving Equipment RC-103-AZ.

** Terminal F for 300 ohm output connection; terminal G for 4000 ohm output connection.

Table 3 (Cont'd) CONTINUITY TEST TABLES

Part 2. Tests for connections from receptacle 86 (socket for Plug PL-Q254), in Radio Receiver BC-733-A to apparatus terminals in the receiver. (See Fig. 7.)

From Terminal Designation	Wire Color	To Apparatus Designation	Ohmmeter Scale	Resistance Ohms	Probable Cause of Incorrect Reading
A	Slate	Chassis	0-1,000	1.0	Open Circuit
B	None	None	0-1,000,000	Infinite	Short Circuit
C	Brown	8-12, 81-6 81-5, 81-4, 81-3, 81-2, 81-1, 51, 87	0-1,000	1.0	Open Circuit
D	Red	91, 48-1	0-1,000	1.0	Open Circuit
E	Yellow	91, 48-2	0-1,000	1.0	Open Circuit
F	Green	82, 40-1, 46-3	0-1,000	1.0	Open Circuit
G	Blue	54-1	0-1,000	1.0	Open Circuit
H	Black	51, 87	0-1,000	1.0	Open Circuit
I	Blue-Red	8-11, 81-1	0-1,000	1.0	Open Circuit
J	Red-Green	8-10, 81-2	0-1,000	1.0	Open Circuit
K	Brown-Red	8-9, 81-3	0-1,000	1.0	Open Circuit
L	Slate-Red	8-8, 81-4	0-1,000	1.0	Open Circuit
M	Black-Red	8-7, 81-5	0-1,000	1.0	Open Circuit
N	Yellow-Green	8-6, 81-6	0-1,000	1.0	Open Circuit

Table 3 (Cont'd) CONTINUITY TEST TABLES

Part 3. Tests for connections from receptacle 202 in Radio Control Box BC-732-A to apparatus terminals in the control box. (See Fig. 11.)

From Terminal Designation	Wire Color	To Apparatus Designation	Ohmmeter Scale	Resistance Ohms	Probable Cause of Incorrect Reading
A	Slate	201, 203, 204	0-1,000	1.0	Open Circuit
B	None	None	0-1,000,000	Infinite	Short Circuit
C	Brown	205	0-1,000	1.0	Open Circuit
D	None	None	0-1,000,000	Infinite	Short Circuit
E	None	None	0-1,000,000	Infinite	Short Circuit
F	Green	201, 203	0-1,000	1.0	Open Circuit
G	Blue	203	0-1,000	1.0	Open Circuit
H	Black	205	0-1,000	1.0	Open Circuit
I	Blue-Red	204	0-1,000	1.0	Open Circuit
J	Red-Green	204	0-1,000	1.0	Open Circuit
K	Brown-Red	204	0-1,000	1.0	Open Circuit
L	Slate-Red	204	0-1,000	1.0	Open Circuit
M	Black-Red	204	0-1,000	1.0	Open Circuit
N	Yellow-Green	204	0-1,000	1.0	Open Circuit

Table 3 (Cont'd) CONTINUITY TEST TABLES

Part 4. Tests between terminals on receptacle 202 in Radio Control Box BC-732-A. Switch 205 in "ON" position. (See Fig. 11.)

Terminal Designations	Selector Switch Position	Ohmmeter Scale	Resistance Ohms	Probable Cause of Incorrect Reading
A to F	Any	0-1,000,000	24,000-36,000	Defective Volume Control
A to G	Any	0-1,000,000	0-36,000*	Defective Volume Control
A to I	U	0-1,000	1.0	Defective Selector Switch
A to J	V	0-1,000	1.0	Defective Selector Switch
A to K	W	0-1,000	1.0	Defective Selector Switch
A to L	X	0-1,000	1.0	Defective Selector Switch
A to M	Y	0-1,000	1.0	Defective Selector Switch
A to N	Z	0-1,000	1.0	Defective Selector Switch
H to C	Any	0-1,000	1.0	Defective Power Switch

* Depending on position of volume control knob.

29. TABLE 4 — Voltages at Socket Terminals of Radio Receiver BC-733-A

(28 Volts at Battery)

Term No.	111-1	111-2	112-1	112-2	113	114	115	111-3	116-1	116-2
1	0	0	0	0	50**	0	0	0	0	0
2	6.8*	0	13.6*	13.6*	0	13.6*	0	6.8*	—180	0
3	0	1.1*	0	0	50**	220	130	0	0	6.6*
4	0	0	—0.5*	—0.5*	—	213	0	0	—220	0
5	0	2.1	0	0	—	0	0	0	—220	0
6	100	112	125	125	213	0	130***	115	217	186
7	13.6	6.8*	27.2*	27.2	0	27.2	0	0	13.6*	13.6*
8	170	170	208	208	13.6*	14.6*	13.6*	165	27.2	0

TABLE 5 — Voltages at Socket Terminals of Radio Receiver BC-733-A

(14 Volts at Battery)

Term. No.	111-1	111-2	112-1	112-2	113	114	115	116-1	116-2
1	0	0	0	0	50**	0	0	0	0
2	6.6*	0	13.2*	13.2*	0	13.2*	0	—180	0
3	0	1.1*	0	0	50**	220	130	0	6.6*
4	0	0	—0.5*	—0.5*	—	213	0	—220	0
5	0	2.1	0	0	—	0	0	—220	0
6	100	112	125	125	213	0	130**	217	186
7	13.2*	6.6*	0	0	0	0	0	13.2*	13.2*
8	170	170	208	208	13.2*	14.6*	13.2*	0	0

* These voltages measured on 25 volt scale, 1000 ohms per volt voltmeter. All other voltages on 250 volt scale.
** These voltages subject to greater than ±10 per cent variation.
*** Measured at top of coil 64 with crystal in circuit.

30. TABLE OF REPLACEABLE PARTS

Radio Receiving Equipment RC-103-A

and

Radio Receiving Equipment RC-103-AZ

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
1-1, 1-2	3D9005-18	Ceramic Capacitor	5 mmf ± 0.25 mmf, N-80 1300 V.D.C. Test	Antenna Tuning R. F. Tuning	ERIE	N80K5 ± 0.25	ESO-690310-6
2	3D9003-11	Ceramic Capacitor	3 mmf ± 0.25 mmf, N-80 1300 V.D.C. Test	R. F. Coupling	ERIE	N80K3 ± 0.25	ESO-690310-4
3-1, 3-2, 3-3, 3-4	3D9050-49	Ceramic Capacitor	50 mmf ± 5 mmf, N-750 1300 V.D.C. Test	R. F. Bypass	ERIE	N750K50 ± 5	ESO-690310-12
4-1, 4-2, 4-3, 4-4, 4-5, 4-6	3D9500-56	Mica Capacitor	500 mmf ± 20% 1300 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM	1468S 5WS 0 503M	ESO-690309-33
5	3D9020-7	Ceramic Capacitor	20 mmf ± 1.0 mmf, N-750 1300 V.D.C. Test	R. F. Bypass	ERIE	N750K20 ± 1	ESO-690310-11
6	3D9001-6	Ceramic Capacitor	1.0 mmf ± 0.25 mmf, N-80 1300 V.D.C. Test	R. F. Coupling	ERIE	N80K1 ± 0.25	ESO-690310-2
7-1, 7-2, 7-3	3DA10-107	Mica Capacitor	10,000 mmf −10% 600 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM	14675 1WS 0 503M	ESO-690309-3
8-1, 8-2, 8-3, 8-4, 8-5, 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, 8-12, 8-13, 8-14	3DA1-65	Mica Capacitor	1,000 mmf ± 20% 600 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM	1468S 5WS 0 503M	ESO-690309-34
9-1, 9-2	3D9050-50	Mica Capacitor	50 mmf ± 10% 1000 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM	1468S 5WS 0 503M	ESO-690309-31
10A, 10B	3DA100-87	Paper Capacitor	2 Sec. 0.1 mf, 600 V.D.C. −.02 +.03 mf	A. F. Coupling	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-688857-1
11	3DA2-68	Mica Capacitor	2,000 mmf ± 10% 600 V.D.C. Test	A. F. Coupling	AERO C-D M-M EM	1467S 1WS 0 503M	ESO-690309-4
12-1	3DF6001	Dry Electrolytic Capacitor	50 mf, 25 V.D.C.	A. F. Bypass	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-688857-2
12-2	3DF6002	Dry Electrolytic Capacitor	50 mf, 25 V.D.C.	A. F. Bypass	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-688857-3
13	3DA500-52	Paper Capacitor	0.5 mf, 600 V.D.C.	A.V.C. Bypass	SOL M-M C-D	Order by Dwg. No. Order by Dwg. No. Order by Dwg. No.	ESO-690308-2

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
14	3D9050-52	Mica Capacitor	50 mmf ± 5% Silver Mica 1000 V.D.C. Test	R. F. Tuning	AERO EM ERIE	1469S 603M K	ESO-690310-31
15	3D9010-20	Ceramic Capacitor	10 mmf ± 1.0 mmf, N-80 1300 V.D.C. Test	R. F. Tuning	ERIE	N80K10 ± 1	ESO-690310-9
16-1, 16-2, 16-3	3DA6-31	Mica Capacitor	6000 mmf ± 20% 600 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM SOL	1467S 1WS 0 503M MWW	ESO-690309-2
17	3D9100-63	Mica Capacitor	100 mmf ± 5% Silver Mica 1000 V.D.C. Test	Bias Osc. Tuning	AERO C-D M-M EM ERIE	1469S 5RS 0 603M K	ESO-690310-32
18	3D9007A5-1	Ceramic Capacitor	7.5 mmf ± 0.25 mmf, N-80 1300 V.D.C. Test	R. F. Tuning	ERIE	N80K7 .5 ± 0.25	ESO-690310-7
19	3D9012-3	Ceramic Capacitor	12 mmf ± 0.5 mmf, N-80 1300 V.D.C. Test	R. F. Tuning	ERIE	N80K12 ± 0.5	ESO-690310-13
20A, 20B, 20C	3DA100-88	Paper Capacitor	3 Sec. 0.1 mf, 600 V.D.C. −.02 +.03 mf	R. F. Bypass	AERO C-D SOL M-M	Order by Dwg. No. Order by Dwg. No. Order by Dwg. No. Order by Dwg. No.	ESO-690308-6
21	3DB1.308	Paper Capacitor	1.0 mf, 600 V.D.C. −0.2 +0.3 mf	Visual Coupling	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-688858-1
22A, 22B	3DF6003	Dry Electrolytic Capacitor	2 Sec. mf, 300 V.D.C. −1.6 +6.4 mf	H. V. Bypass	C-D SPR MALL	Order by Dwg. No. Order by Dwg. No. Order by Dwg. No.	ESO-690308-5
23	3D9100-65	Ceramic Capacitor	100 mmf ± 10 mmf, N-750 1300 V.D.C. Test	R. F. Bypass	ERIE	N750L100 ± 10	ESO-690317
24-1, 24-2, 24-3, 24-4, 24-5, 24-6, 24-7, 24-8, 24-9, 24-10, 24-11, 24-12	3D9030-10	Ceramic Capacitor	30 mmf ± 1.5 mmf, N-80 1300 V.D.C. Test	I. F. Tuning	ERIE	N80L30 ± 1.5	ESO-690310-16
25-1, 25-2, 25-3, 25-4, 25-5	3DA6-32	Mica Capacitor	6000 mmf ± 20% 600 V.D.C. Test	R. F. Bypass	AERO C-D M-M EM SOL	1467S 1WS 0 503M MWW	ESO-690309-16 or ESO-690309-2
26-1, 26-2, 26-3	3D9100-64	Mica Capacitor	100 mmf ± 10% 1000 V.D.C. Test	R. F. Coupling	AERO C-D M-M EM	1468S 5WS 0 503M	ESO-690309-32
27	3D9004-1	Ceramic Capacitor	4 mmf ± 0.25 mmf, N-80 1300 V.D.C. Test	R. F. Tuning	ERIE	N80K4 ± 0.25	ESO-690310-5
30	3Z6800A1	Resistor	0.1 megohm ± 20% ½ Watt	R. F. Grid Res.	A-B	EB-1042	ESO-690364-105

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
31	3ZF4026	Resistor	6800 Ohm ± 10% ½ Watt	Det. Cath. Res.	A-B	EB-6821	ESO-690364-35
32	3Z6627-7	Resistor	27,000 Ohm ± 10% ½ Watt	R. F. Scr. Filter	A-B	EB-2731	ESO-690364-42
33-1, 33-2, 33-3, 33-4, 33-5, 33-6	3Z6100-52	Resistor	1000 Ohm ± 10% ½ Watt	Plate Filter and Cath. Res.	A-B	EB-1021	ESO-690364-25
34-1, 34-2, 34-3	3Z6800A22	Resistor	0.22 Megohm ± 10% ½ Watt	R. F. Grid Res.	A-B	EB-2241	ESO-690364-53
35	3Z6022-9	Resistor	220 Ohm ± 10%, ½ Watt	Mod. Cath. Res.	A-B	EB-2211	ESO-690364-17
36	3Z6010-37	Resistor	100 Ohm ± 10%, ½ Watt	Mod. Plate Res.	A-B	EB-1011	ESO-690364-13
37-1, 37-2, 37-3	3Z6639-3	Resistor	39,000 Ohm ± 10% ½ Watt	I. F. Scr. Res. R. F. Scr. Res.	A-B	EB-3931	ESO-690364-44
38	3Z6802A-5	Resistor	2.2 Megohm ± 10% ½ Watt	A. F. Grid Res.	A-B	EB-2251	ESO-690364-65
39-1, 39-2, 39-3	3Z6800A27	Resistor	0.27 Megohm ± 10% ½ Watt	A.V.C.—Audio Res.	A-B	EB-2741	ESO-690364-54
40-1, 40-2, 40-3	3Z6800A56	Resistor	0.56 Megohm ± 10% ½ Watt	A.V.C.—Audio Res.	A-B	EB-5641	ESO-690364-58
41-1, 41-2	3Z6682-4	Resistor	82,000 Ohm ± 10% ½ Watt	A.V.C.—Filter R. F. Scr. Res.	A-B	EB-8231	ESO-690364-48
42-1, 42-2	3Z6582-2	Resistor	8,200 Ohm ± 10% ½ Watt	R. F. Plate Res.	A-B	EB-8221	ESO-690364-36
43	3Z6800A12	Resistor	0.12 Megohm ± 10% ½ Watt	Det. Cath. Res.	A-B	EB-1541	ESO-690364-50
44-1, 44-2	3Z6800A18	Resistor	0.18 Megohm ± 10% ½ Watt	R. F. Grid Res.	A-B	EB-1841	ESO-690364-52
45-1, 45-2, 45-3	3Z6610-52	Resistor	10,000 Ohm ± 10% ½ Watt	Plate and Grid Filter	A-B	EB-1031	ESO-690364-37
46-1, 46-2, 46-3	3Z6330-3	Resistor	3,300 Ohm ± 20% ½ Watt	Feed Back and Balance Res.	A-B	EB-3322	ESO-690364-96
47-1, 47-2	3Z6050-41	Resistor, Wire Wound	500 Ohm ± 10%, ½ Watt	Imp. Matching Res.	IRC	BW ½	ESO-690364-74
48-1, 48-2	3Z6100-53	Resistor, Wire Wound	1,000 Ohm ± 10%, 1 Watt	Visual Output Load Res.	IRC	BW 1	ESO-690364-79
49	3Z4863-1	Resistor, Vit. Enameled	63 Ohm ± 10%, 5 Watt	Heater Cir. Balance Res.	HA-HI UTAH W-L	1G 63 Ohm X-1060 1Z-63 Ohm	ESO-690365-3
50	3Z4836	Resistor, Vit. Enameled	36 Ohm ± 10%, 5 Watt	Heater Cir. Balance Res.	HA-HI UTAH W-L	1G 36 Ohm X-1059 1Z-36 Ohm	ESO-690365-2
51	3Z4840-3	Resistor, Vit. Enameled	40 Ohm ± 10%, 10 Watt	Relay Series Res.	HA-HI UTAH W-L	1¾G 40 Ohm X-1058 1¾Z 40 Ohm	ESO-690365-1
52	3Z6656-5	Resistor	56,000 Ohm ± 10% ½ Watt	Bias Osc. Grid Res.	A-B	EB-5631	ESO-690364-46

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
54-1, 54-2	3Z6220-3	Resistor	2,200 Ohm ± 10% ½ Watt	A. F. Output and Plate Filter	A-B	EB-2221	ESO-690364-29
55	3Z5420.8	Resistor, Vit. Enameled	2,000 Ohm ± 10%, 8 Watt	R. F. Plate Series Res.	HA-HI UTAH W-L	1½G 2000 Ohm X-1061 1½Z 2000 Ohm	ESO-690365-4
56	3Z6612-9	Resistor	12,000 Ohm ± 10% ½ Watt	Vis. Output Grid Res.	A-B	EB-1231	ESO-690364-38
57-1, 57-2, 57-3, 57-4	3Z6150-25	Resistor	1,500 Ohm ± 20% ½ Watt	R. F. Grid Res.	A-B	EB-1521	ESO-690364-94
61	3F2915	Antenna Coil	Antenna Coil	Tuning & Coupling	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690322-1
62-1, 62-2, 62-3, 62-4	3F2915-1	R. F. Coil	R. F. Coil	Tuning	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690323-1
63	3F2915-2	R. F. Coil	R. F. Coil	Tuning	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690324-1
64	3F2915-3	R. F. Coil	R. F. Coil	Tuning	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690324-2
65-1, 65-2	3F2915-4	R. F. Coil	R. F. Coil	Tuning	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690324-3
66	3C1987-30	Choke Coil	Plate Choke	Plate Choke	WE JEFF	Order by Dwg. No. Order by Dwg. No.	KS-8730
67	3C1987-29	Choke Coil	Plate Filter	Plate Supply Filter	WE JEFF	Order by Dwg. No. Order by Dwg. No.	KS-8729
68	3C303-1	Choke Coil	Dynamotor Choke Coil	Filter Noise	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690819-1
81-1, 81-2, 81-3, 81-4, 81-5, 81-6	2Z7612	Relay	Crystal Relay	Frequency Switching	DELC MUT AM-T	Order by Dwg. No. Order by Dwg. No. Order by Dwg. No.	ESO-691209-1
82	2Z9879	Output Transformer	Audio Output Transformer	Impedance Matching	WE JEFF	Order by Dwg. No. Order by Dwg. No.	KS-8728
83	2C5400-103A/F1	Output Transformer	90 Cycle Output Trans.	Band Pass Filter	WE THOR	Order by Dwg. No. Order by Dwg. No.	KS-8726
84	2C5400-103A/F2	Output Transformer	150 Cycle Output Trans.	Band Pass Filter	WE THOR	Order by Dwg. No. Order by Dwg. No.	KS-8727
85	2ZF4002	Receptacle	Twinax Receptacle SO-264	Antenna Connection	AMPH	83-22R	ESO-688856-1
86	2ZF4001	Receptacle	Per AN3102-20-27P	Power and Controls	AMPH CANN	AN-3102-20-27P AN-3102-20-27P	ESO-690818-2
87	2Z7228-4	Plug	Dynamotor Plug	Connection and Switching	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-691210-2
88	2Z5540	Jack	Closed Circuit Jack	Meter	MAL	Midget A-2	ESO-688652-2
89	2Z7292-15M	Potentiometer	Locking Potentiometer (75,000 Ohms Special)	Visual Output Level	A-B IRC	Order by Dwg. No. Order by Dwg. No.	ESO-690350-1

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
90	2Z7296-75M2	Potentiometer	Locking Potentiometer (5000 Ohms W.W. Linear)	Visual Output Balance	IRC	Order by Dwg. No.	ESO-690351-1
91	2Z7296-75M2	Varistor	Copper Oxide Rectifier	Balanced Rectifier	WE	D-162605	D-162605
92	2Z3501-20-5633.333 or 2Z3543-5633.333	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5633.333 KC or Crystal Holder FT-243 5633.333 KC	Frequency Control	WE BLIL	D-150732 5633.333 KC FT-243 5633.333 KC	D-150732 Crosley Dwg. C-215345
93	2Z3501-20-5655.555 2Z3543-5655.555	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5655.555 KC or Crystal Holder FT-243 5655.555 KC	Frequency Control	WE BLIL	D-150732 5655.555 KC FT-243 5655.555 KC	D-150732 Crosley Dwg. C-215345
94	2Z3501-20-5677.778 2Z3543-5677.778	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5677.778 KC or Crystal Holder FT-243 5677.778 KC	Frequency Control	WE BLIL	D-150732 5677.778 KC FT-243 5677.778 KC	D-150732 Crosley Dwg. C-215345
95	2Z3501-20-5700.000 2Z3543-5700.000	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5700.000 KC or Crystal Holder FT-243 5700.000 KC	Frequency Control	WE BLIL	D-150732 5700.000 KC FT-243 5700.000 KC	D-150732 Crosley Dwg. C-215345
96	2Z3501-20-5722.222 2Z3543-5722.222	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5722.222 KC or Crystal Holder FT-243 5722.222 KC	Frequency Control	WE BLIL	D-150732 5722.222 KC FT-243 5722.222 KC	D-150732 Crosley Dwg. C-215345
97	2Z3501-20-5744.444 2Z3543-5744.444	Crystal Unit DC-20 or Crystal Holder FT-243	Crystal Unit DC-20 5744.444 KC or Crystal Holder FT-243 5744.444 KC	Frequency Control	WE BLIL	D-150732 5744.444 KC FT-243 5744.444 KC	D-150732 Crosley Dwg. C-215345
100-1, 100-2, 100-3	2Z8670.4	Socket	Octal Ceramic Tube Socket	Holds Tubes 111-1, 111-2, 111-3	CINC UCIN	9882 and 8493 115015-2 and C152	ESO-690346-1
101-1, 101-2, 101-3, 101-4, 101-5, 101-6, 101-7	2Z8670.5	Socket	Octal Phenolic Tube Socket	Holds Tubes 112-1, 112-2, 113, 114, 115, 116-1, 116-2	CINC AMPH	9889 and 8493 Order by Dwg. No.	ESO-690347-1
103	3Z745	Binding Post	Ground Binding Post	Ground Terminal	ARH SO MA	No. 1755 Eng "G" No. 10170A	ESO-688637-3
104	2Z4922-2	Handle	Receiver Handle	To Carry Receiver	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-684446-6
105A, 105B	2Z8761-7	Socket	Crystal Socket	Holds Crystals 5633.333 KC and 5655.555 KC	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690323-2
106A, 106B	2Z8761-8	Socket	Crystal Socket	Holds Crystals 5677.777 KC and 5700.000 KC	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690323-3
107A, 107B	2Z8761-9	Socket	Crystal Socket	Holds Crystals 5722.222 KC and 5744.444 KC	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690323-4

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
111-1, 111-2, 111-3	2T269	Vacuum Tube VT-269	Ultra HF Pentode Vacuum Tube (Western Electric 717A)	R.F. Amplifier 1st Det., Harmonic Gen.	WE TUNG RAY	VT-269 VT-269 VT-269	
112-1, 112-2	2T209	Vacuum Tube VT-209	RF Pentode Vacuum Tube (12SG7)	IF Amplifier	RCA K-R	VT-209 VT-209	Signal Corps Spec. 71-1409
113	2T104	Vacuum Tube VT-104	Duplex Diode High Mu Triode Vacuum Tube (12SQ7)	2nd Det., A.V.C. Audio Amp.	RCA K-R	VT-104 VT-104	Signal Corps Spec. 71-1207
114	2T134	Vacuum Tube VT-134	Beam Power Ampl. Vacuum Tube (12A6)	Audio Amplifier	RCA K-R	VT-134 VT-134	Signal Corps Spec. 71-1234
115	2T207	Vacuum Tube VT-207	Duplex Triode Vacuum Tube (12AH7-GT)	Oscillator and Harmonic Gen.	RCA K-R	VT-207 VT-207	
116-1, 116-2	2T133	Vacuum Tube VT-133	Duplex Diode and Low Mu Triode Vacuum Tube (12SR7)	Bias Osc. & Rectifier, Visual Output	RCA K-R	VT-133 VT-133	Signal Corps Spec. 71-1233
120-1, 120-2	2C5400-103A/C1	IF Transformer	IF Transformer	6.9 mc Transformer	WE CROS WE	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690312-1
121	2C5400-103A/C2	IF Transformer	IF Transformer	6.9 mc Transformer	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690313-1
122	2C5400-103A/C3	Bias Osc. Assembly	Includes 17, 26-2, 54-2, 71A, 71B	Bias Supply	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690356-1
130	4C5800	Terminal Board	Includes 57-2	Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-684452-2
131	4C5801	Terminal Board	Includes 8-5, 8-13, 32-3, 33-6, 45-1, 45-2	Resistor and Condenser Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690326-1
132	4C5802	Terminal Board	Lead Through Term.	Insulated Terminal	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690326-4
133	4C5803	Terminal Board	Includes 33-2, 39-3, 40-1, 40-2, 40-3, 41, 42, 43, 44-2, 46-1, 46-2, 47-1, 47-2, 48-1, 48-2, 53-1, 54, 56	Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690348-1
134	4C5804	Terminal Board	Includes 57-1, 57-3	Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690362-1
135	4C5805	Terminal Board	Includes 57-4	Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690362-4
136	4C5806	Terminal Board	Includes 32-1, 32-2	Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690363-1
137	2A2860	Terminal Board	Includes 8-6, 8-7, 8-8, 8-9, 8-10, 8-11, 8-12	Condenser Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-691201-1
138	2A2862	Terminal Board	Includes 4-4, 7-2, 9-2, 11, 38, 39-1, 39-2	Condenser and Resistor Mounting	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-691201-2

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
FOR RADIO RECEIVER BC-733-A							
139	3H1653A/S6	Stud	Shouldered Screw	Mount Dyn. Plug	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-690357-3
140	2C5400-100A/C4	Cover	Cover, Tube Slide	Protection	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-684439-1
FOR RADIO CONTROL BOX BC-732-A							
201	2Z5537.1	Jack	Phone Jack	Audio Output	MAL ARH	SC-1 No. 1753	ESO-688637-4
203	2Z7262-3M	Potentiometer	Audio Vol. Control (3000 Ohms Special)	Volume Control	A-B	Ord. by Dwg. No.	ESO-690349-1
204	3Z9827.30	Switch	Frequency Switch	Frequency Selection	WE CROS	Ord. by Dwg. No. Ord. by Dwg. No.	ESO-691190-1
205	3Z8934	Switch	Power Switch	Off-On Switch	C-H	Ord. by Dwg. No.	ESO-690347-3
202	2ZF4001	Receptacle	Per AN3102-20-27P	Power and Controls	AMPH CANN	AN-3102-20-27P AN-3102-20-27P	ESO-690818-2
206	2ZF2800	Knob	Bakelite Knob	Volume Control Knob	WE PL-M	Order by Dwg. No. Order by Dwg. No.	ESO-684449-1
207	3Z9827.30/1	Lever	Die Cast Lever	Freq. Switch Lever	WE CDC	Order by Dwg. No. Order by Dwg. No.	ESO-691189-2
210	6RF2200	Wrench	Hex. Set Screw Wrench for 6-32 Countersunk Set Screws	Tighten Set Screws on Knob & Lever	ALL BRIS	Order by Description Order by Description	
FOR MOUNTING FT-293-A (RECEIVER)							
FT-293-A	2Z6721-293-A	Mounting	Receiver Mounting	Shock Mount Receiver	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESR-683746-1
FOR MOUNTING FT-292-A (CONTROL BOX)							
FT-292-A	2Z6721-292A	Mounting	Control Box Mounting	Mount Control Box	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-691198-1
DYNAMOTOR DM-53-A (24 VOLT) FOR RADIO RECEIVING EQUIPMENT RC-103-A ONLY							
DM-53-A	3H1653A	Dynamotor	Dynamotor and Mounting	High Voltage Supply	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690359-1
310	3H1653A/A1	Dynamotor Armature	Armature and Bearings	CO	RED	For KS-5914 List 2	For KS-5914
303	2Z8670.4	Socket	8 Contact Socket	Connections and Switching	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-691210-4

TABLE OF REPLACEABLE PARTS (Continued)

Reference Number	Signal Corps Stock No.	Name of Part	Description of Part	Function of Part	Manufacturer of Part		Spec. or Drawing No.
					Mfr.	Mfg. Type No.	
DYNAMOTOR DM-53-A (24 Volt) FOR RADIO RECEIVING EQUIPMENT RC-103-A ONLY							
311		Dynamotor Brushes	Brushes including Pigtail and Spring		RED	For KS-5914	For KS-5914
312	3H1653A/A1	Dynamotor Bearings	Ball Bearings		RED	For KS-5914	For KS-5914
313	3H1653A/S1	Stud	Shouldered Screw	Mount Socket	WE MON	Order by Dwg. No. Order by Dwg. No.	ESO-690357-1
301-1, 301-2	3DF2022 3DF2023	Mica Capacitor	5000 mmf ± 20% 2000 V.D.C. Test or 3000 mmf ± 20% 2000 V.D.C. Test	R. F. Bypass	C-D SOL	3WSP 2000 V.D.C. Test MKW 2000 V.D.C. Test	ESO-690309-17 or ESO-690309-18
FOR DYNAMOTOR DM-53-AZ (12 VOLT) FOR RADIO RECEIVING EQUIPMENT RC-103-AZ ONLY							
DM-53-AZ	3H1653AZ	Dynamotor	Dynamotor and Mounting	High Voltage Supply	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-690359-2
320	3H1653AZ/A1	Dynamotor Armature	Armature and Bearings		RED	For KS-5914, List 1	For KS-5914
304		Socket	8 Contact Socket	Connections and Switching	WE CROS	Order by Dwg. No. Order by Dwg. No.	ESO-691210-3
311		Dynamotor Brushes	Brushes including Pigtail and Spring		RED	For KS-5914	For KS-5914
312	3H1653A/A1	Dynamotor Bearings	Ball Bearings		RED	For KS-5914	For KS-5914
313	3H1653A/S1	Stud	Shouldered Screw	Mount Socket	WE MON	Order by Dwg. No.	ESO-690357-1
301-1, 301-2		Mica Capacitor	5000 mmf ± 20% 2000 V.D.C. Test or 3000 mmf ± 20% 2000 V.D.C. Test	R. F. Bypass	C-D SOL	3WSP 2000 V.D.C. Test MKW 2000 V.D.C. Test	ESO-690309-17 or ESO-690309-18
MISCELLANEOUS PARTS FOR RADIO RECEIVING EQUIPMENTS RC-103-A AND RC-103-AZ							
PL-Q254	2Z7226-254-1	Plug (Rec. Power)	AN-3108-20-27S	Power and Controls	AMPH CANN	AN-3108-20-27S Stamped PL-Q254	ESO-690818-3
PL-284	2Z7226-284	Plug (Rec. Ant.)	Straight Twin Connector Plug	Antenna Connection	AMPH	83-22SP	ESO-688856-2
PL-293	2Z293	Plug (90° Adapter)	Angle Plug	Antenna Connection	AMPH	83-22AP	ESO-688856-3
PL-P256	2Z7226-256.2	Plug (Control Unit)	AN-3106-20-27S	Power and Controls	AMPH	AN-3106-20-27S Stamped PL-P256	ESO-690818-1
PL-P257	2Z7226-257-2	Plug (Indicator)	AN-3106-14S-2S	Indicator Connection	AMPH CANN	AN-3106-14S-2S Stamped PL-P257	ESO-688652-1

31. LIST OF MANUFACTURERS

Abbreviation	Manufacturer	Address
AERO	Aerovox Corporation	New Bedford, Mass.
ARH	American Radio Hardware Co.	476 Broadway, New York, N. Y.
AMPH	American Phenolic Corp.	1830 S. 54th Avenue, Cicero, Ill.
ALL	The Allen Mfg. Co.	Hartford, Conn.
A-B	Allen-Bradley Co.	Milwaukee, Wis.
BLIL	Bliley Electric Co.	Erie, Pa.
BRIS	The Bristol Co.	Mill Supply Div., Waterbury, Conn.
CANN	Cannon Electrical Development	3201 Humboldt, Los Angeles, Calif.
CINC	Cinch Manufacturing Co.	2339 W. Van Buren St., Chicago, Ill.
CROS	The Crosley Corporation	Cincinnati, Ohio
CDC	Cincinnati Die Casting Co.	Cincinnati, Ohio
C-D	Cornell Dubilier Corp.	1006 Hamilton Blvd., South Plainfield, N. J.
C-H	Cutler Hammer, Inc.	1333 W. St. Paul Ave., Milwaukee, Wis.
DELC	Delco Radio Div., General Motors Corp.	Detroit, Michigan
E-M	Electro Motive Mfg. Corp.	S. Park and John Sts., Willimantic, Conn.
ERIE	Erie Resistor Corp.	Erie, Pa.
HA-HI	Hardwick, Hindle Inc.	65 Johnson St., Newark, N. J.
IRC	International Resistance Co.	401 N. Broad St., Philadelphia, Pa.
JEFF	Jefferson Electric Co.	Bellwood, Illinois
K-R	Ken-Rad Tube and Lamp Corp.	Owensboro, Ky.
MAL	P. R. Mallory Co.	Indianapolis, Indiana
MON	Monarch Cap Screw & Mfg. Co.	5906 Park Ave., Cleveland, Ohio
M-M	Micamold Radio Corp.	1087 Flushing Ave., Brooklyn, N. Y.
MUT	Muter Co.	1225 S. Michigan Ave., Chicago, Ill.
PL-M	Plastic Molding Corp.	Sandy Hook, Conn.
RAY	Raytheon Products Corp.	420 Lexington Ave., New York, N. Y.
RED	A. G. Redmond Co.	1941 Hodde St., Owasso, Mich.
RCA	RCA Mfg. Co.	Camden, N. J.
SOL	Solar Mfg. Corp.	Bayonne, N. J.
SOMA	Soreng Manegold Co.	1901 N. Clybourne Ave., Chicago, Ill.
SPR	Sprague Specialties Co.	189 Beaver St., North Adams, Mass.
THOR	Thordarson Elec. Mfg. Co.	500 W. Huron St., Chicago, Ill.
TUNG	Tung Sol Lamp Works, Inc.	95 Eighth Ave., Newark, N. J.
UCIN	Ucinite Co.	1 Nevada St., Newtonville, Mass.
UTAH	Utah Radio Products Co.	820 Orleans St., Chicago, Ill.
WE	Western Electric Co.	New York, N. Y.
W-L	Ward-Leonard Elec. Co.	31 South St., Mount Vernon, N. Y.

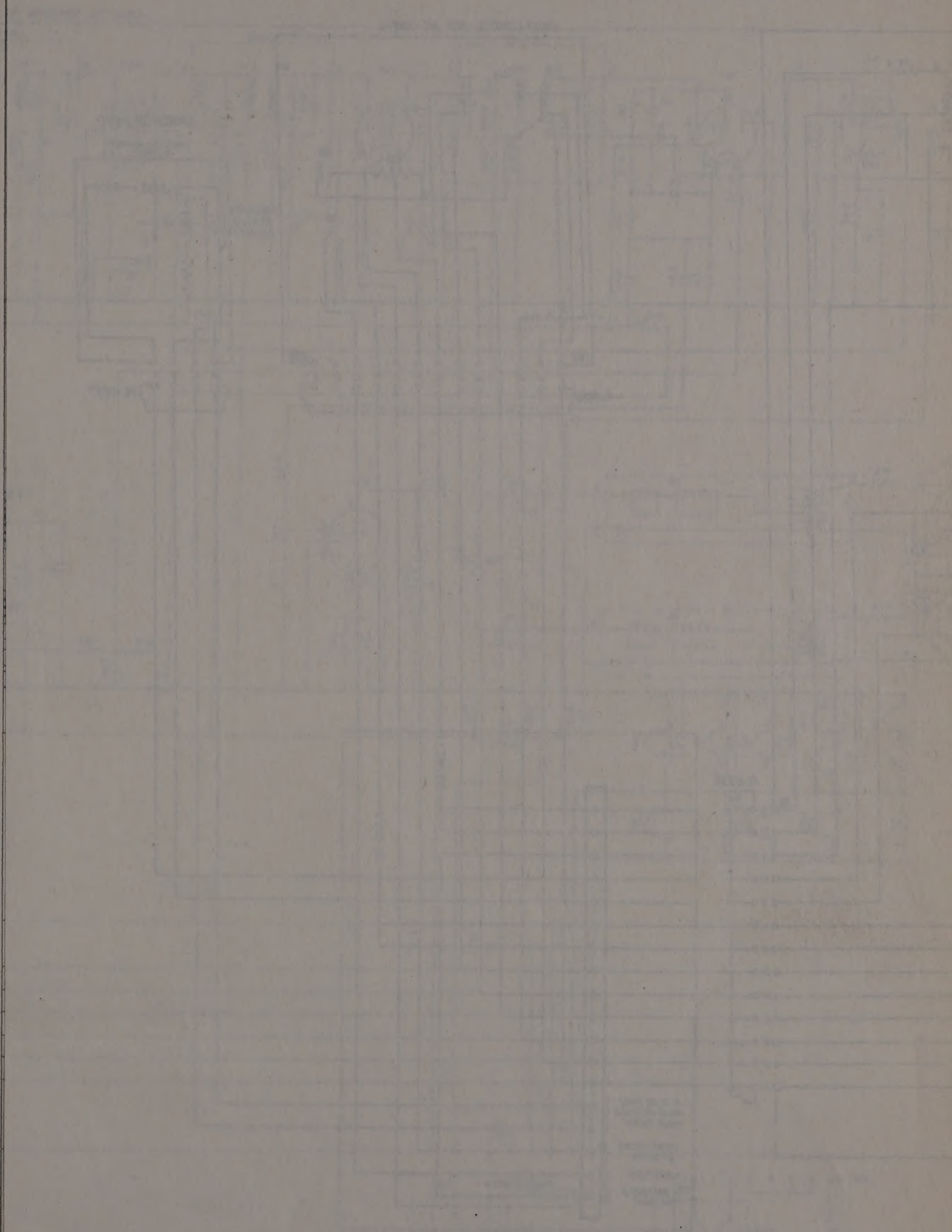
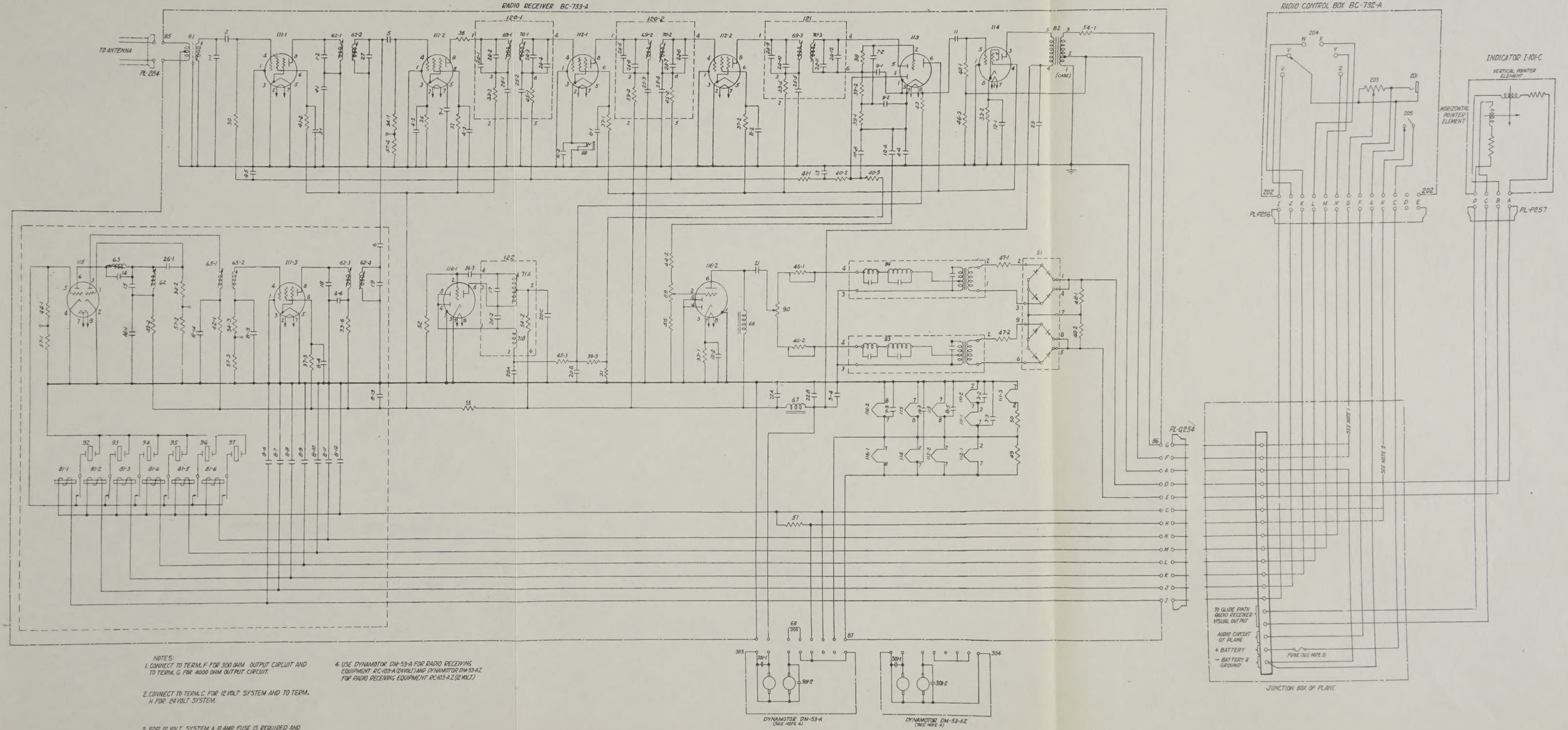


Figure 6 — SCHEMATIC CIRCUIT DIAGRAM OF RADIO RECEIVING EQUIPMENT RC-103-A AND RADIO RECEIVING EQUIPMENT RC-103-AZ



NOTES:

1. CONNECT TO TERM. F FOR 300 OHM OUTPUT CIRCUIT AND TO TERM. G FOR 4000 OHM OUTPUT CIRCUIT.

2. CONNECT TO TERM. C FOR 12 VOLT SYSTEM AND TO TERM. H FOR 24 VOLT SYSTEM.

3. FOR 12 VOLT SYSTEM A 10 AMP. FUSE IS REQUIRED AND FOR A 24 VOLT SYSTEM A 5 AMP. FUSE IS REQUIRED.

4. USE DYNAMOTOR DM-53-A FOR RADIO RECEIVING EQUIPMENT RC-103-A (24 VOLT) AND DYNAMOTOR DM-53-AZ FOR RADIO RECEIVING EQUIPMENT RC-103-AZ (12 VOLT.)

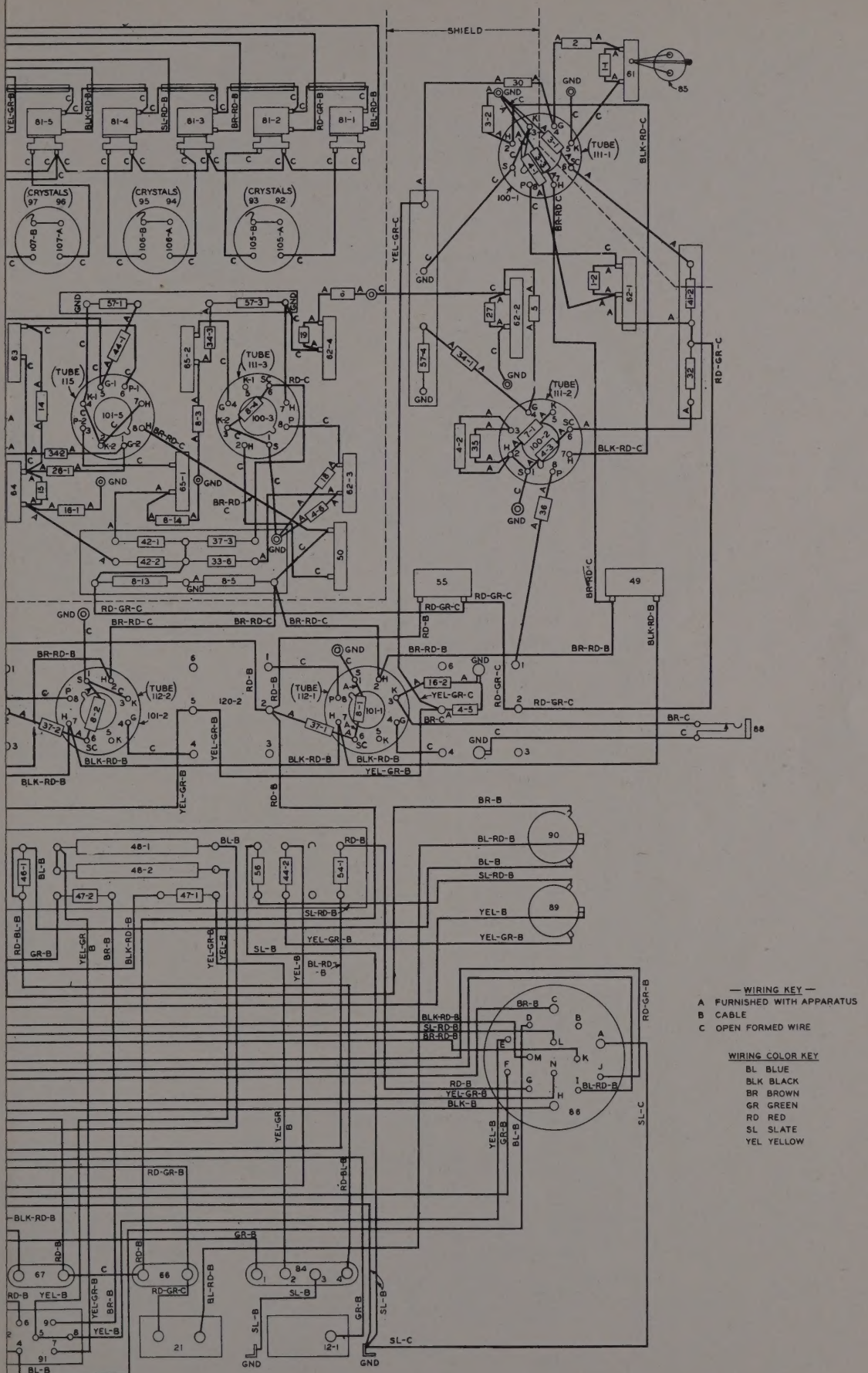


Figure 7 — PRACTICAL WIRING DIAGRAM OF RADIO RECEIVER BC-733-A

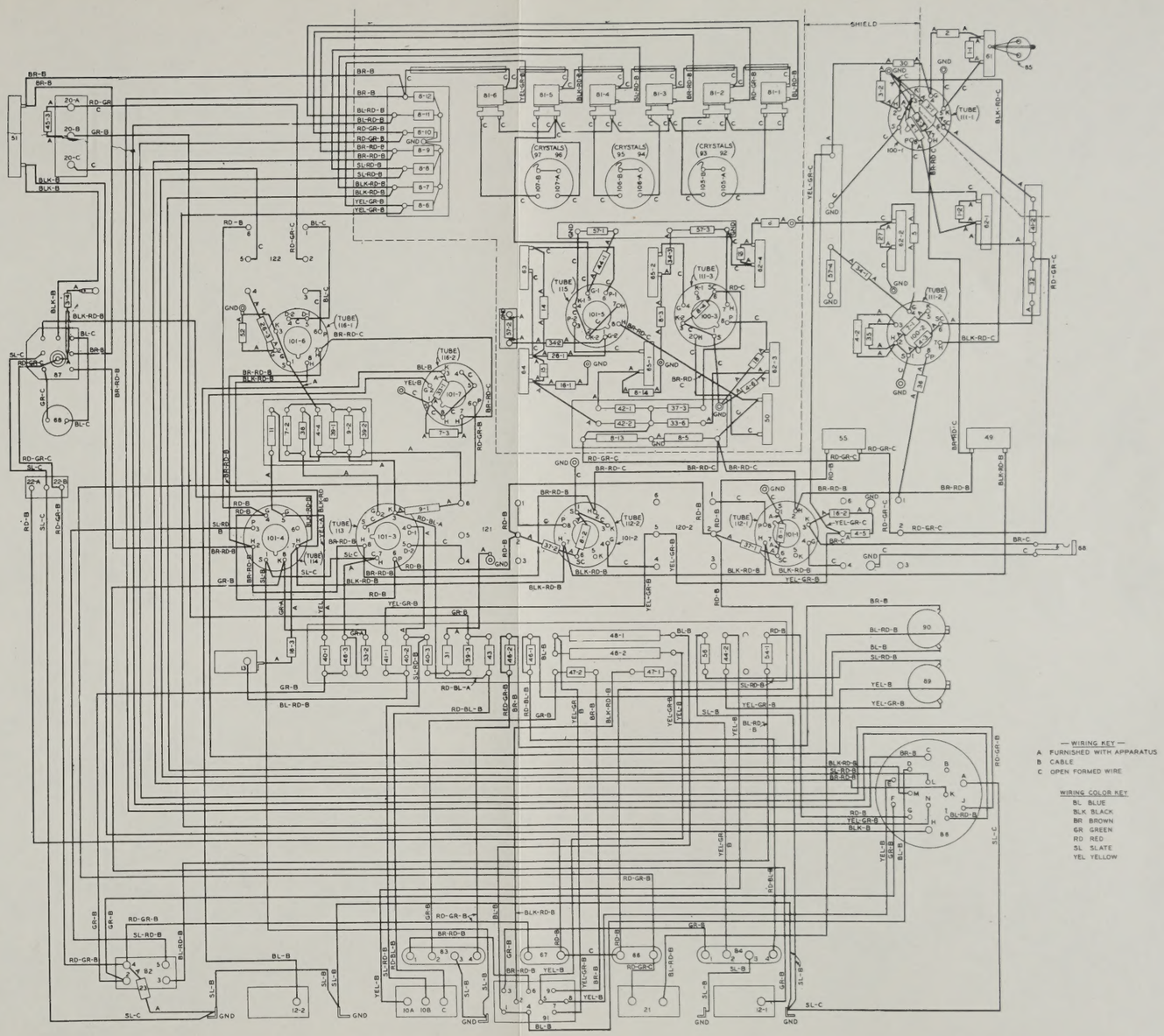


Figure 7 — PRACTICAL WIRING DIAGRAM OF RADIO RECEIVER BC-733-A

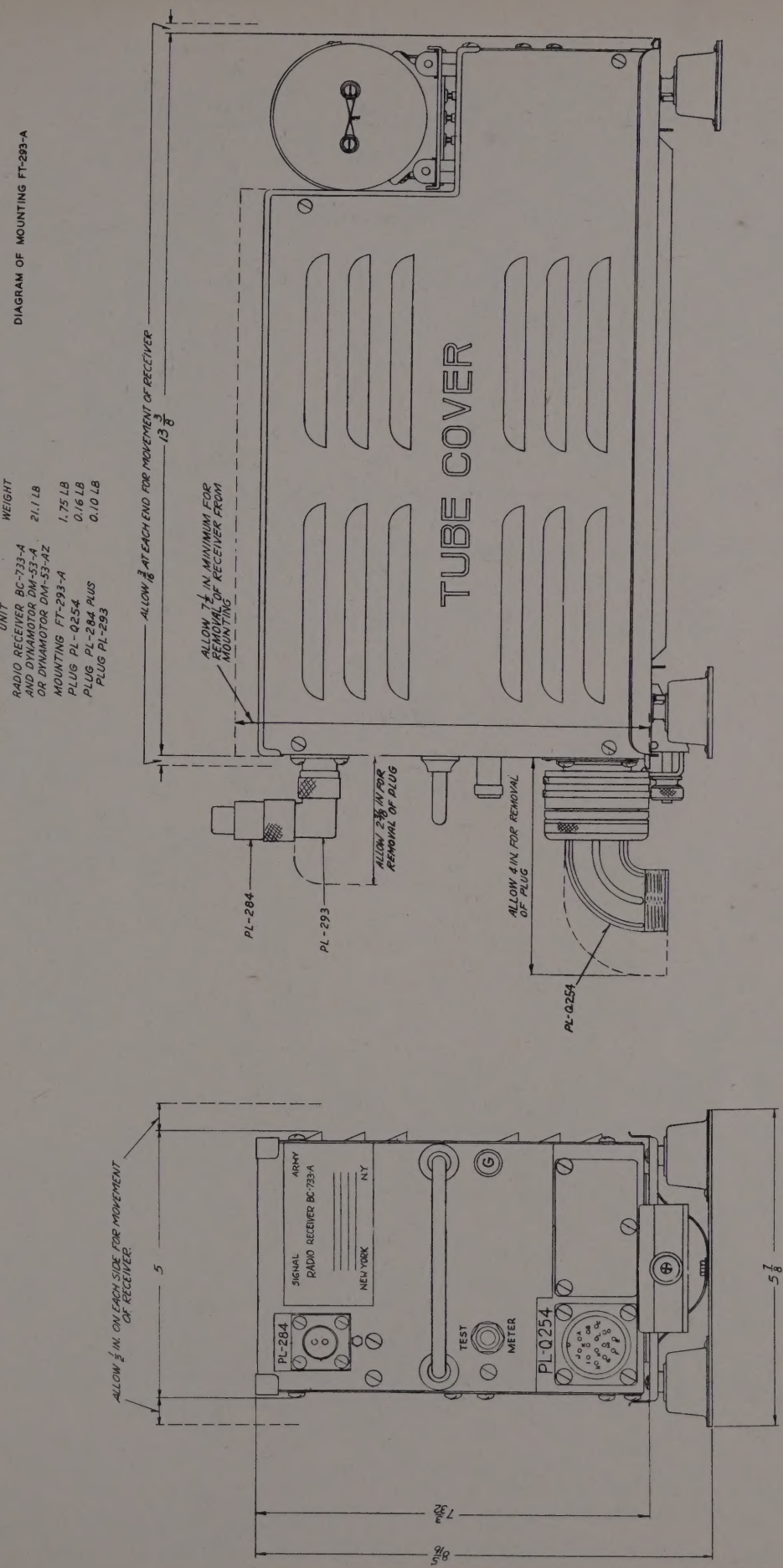
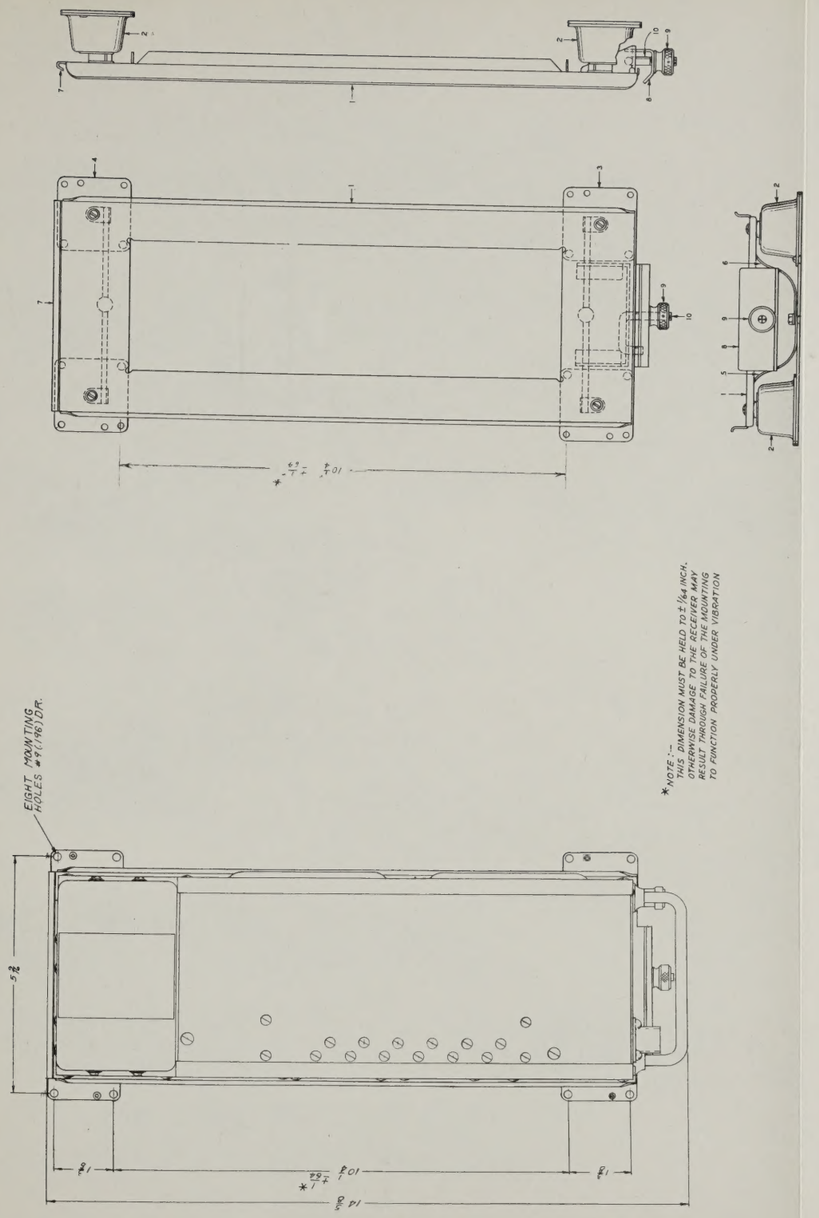
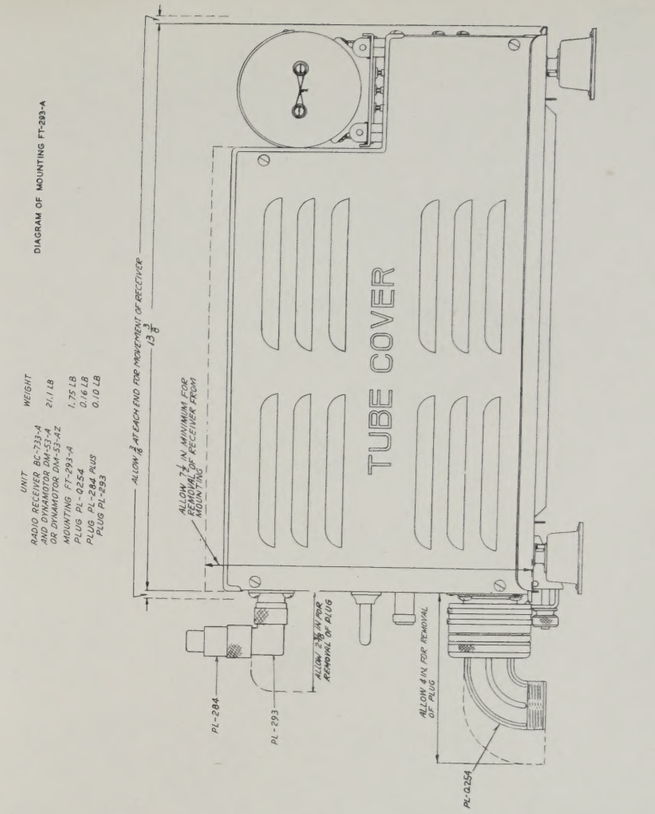


Figure 8 — INSTALLATION DIMENSIONS AND WEIGHT OF RADIO RECEIVER BC-733-A AND MOUNTING FT-293-A


EIGHT MOUNTING HOLES #9 (.196) DR.
★NOTE :-
THIS DIMENSION MUST BE HELD TO ± 1/64 INCH.
OTHERWISE DAMAGE TO THE RECEIVER MAY
RESULT THUS PREVENTING PROPER MOUNTING
TO FUNCTION PROPERLY UNDER VIBRATION



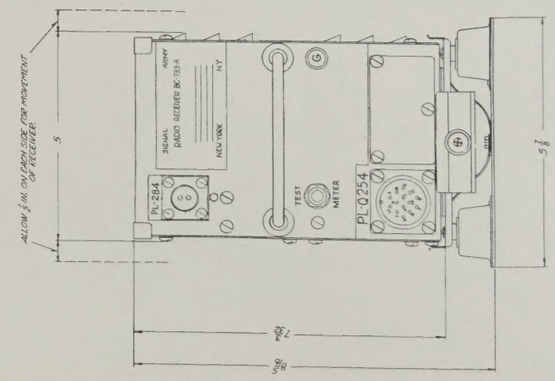


Figure 8 — INSTALLATION DIMENSIONS AND WEIGHT OF RADIO RECEIVER BC-733-A AND MOUNTING FT-293-A

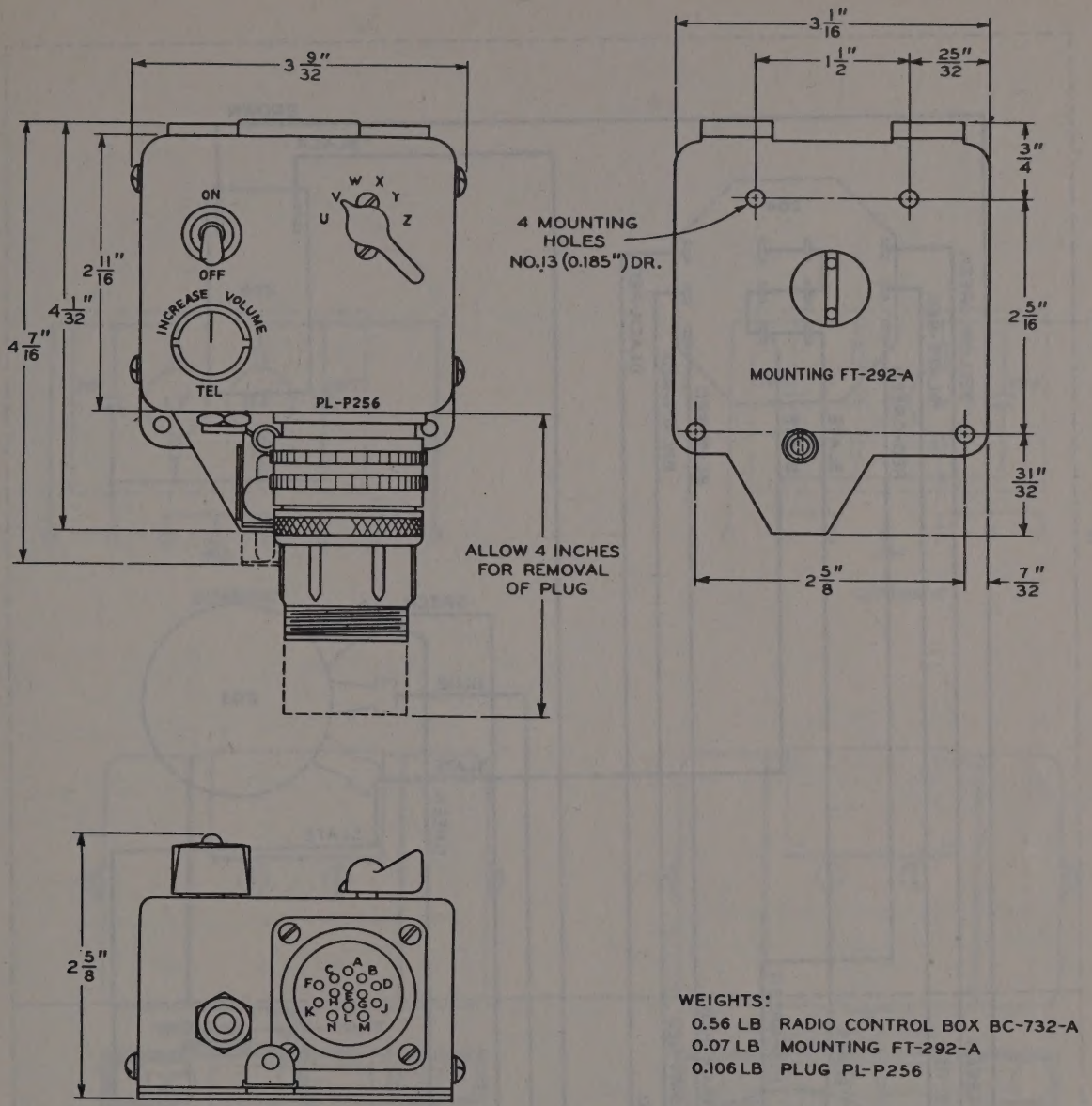


Figure 9 — INSTALLATION DIMENSIONS AND WEIGHT OF RADIO CONTROL BOX BC-732-A

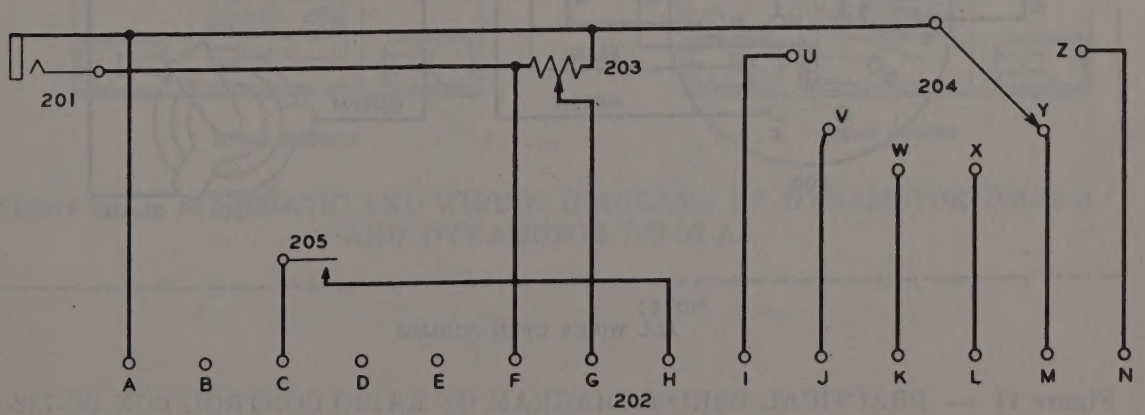


Figure 10 — SCHEMATIC CIRCUIT DIAGRAM OF RADIO CONTROL BOX BC-732-A

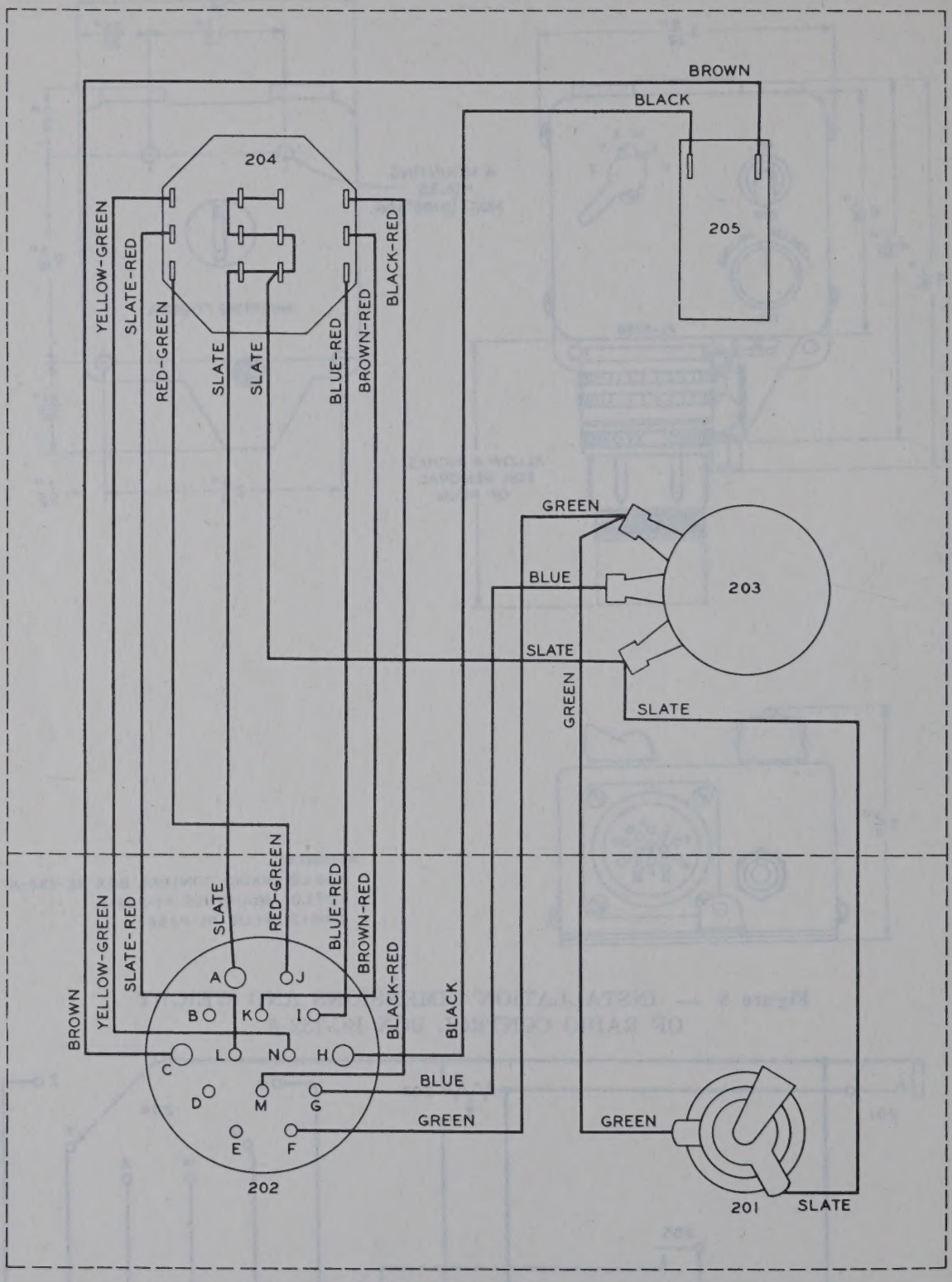


Figure 11 — PRACTICAL WIRING DIAGRAM OF RADIO CONTROL BOX BC-732-A

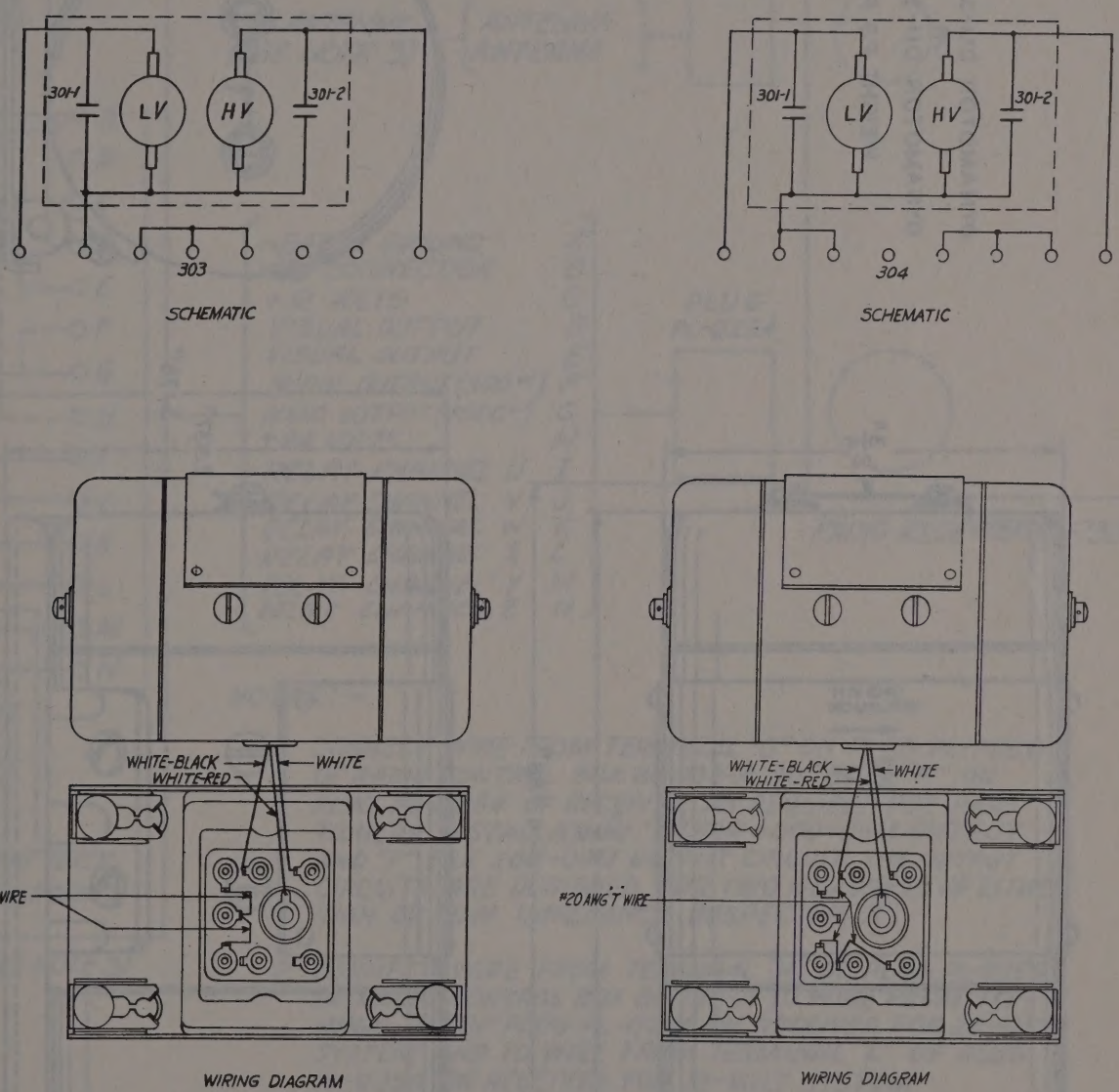


Figure 12 — SCHEMATIC AND WIRING DIAGRAMS OF DYNAMOTOR DM-53-A AND DYNAMOTOR DM-53-AZ

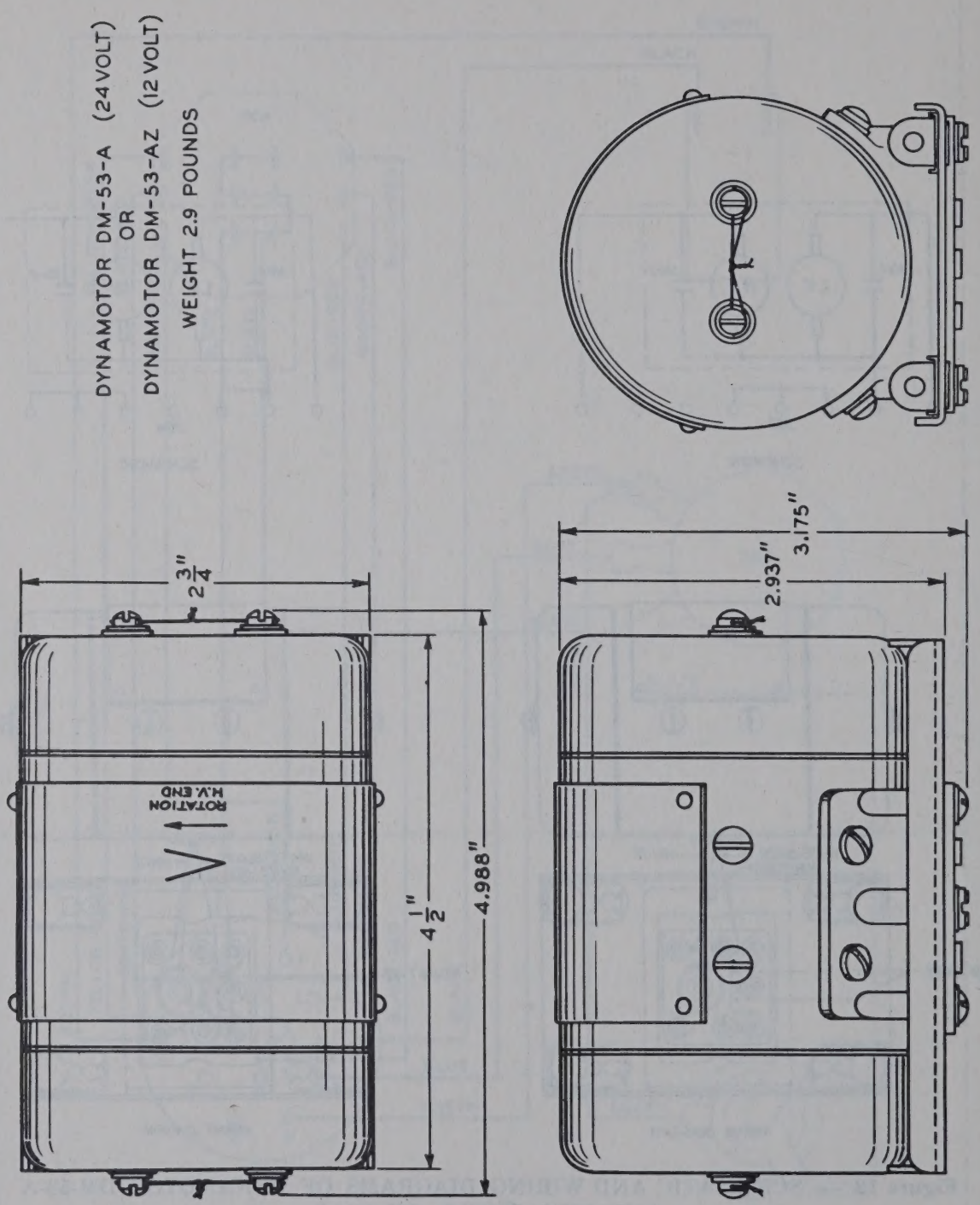
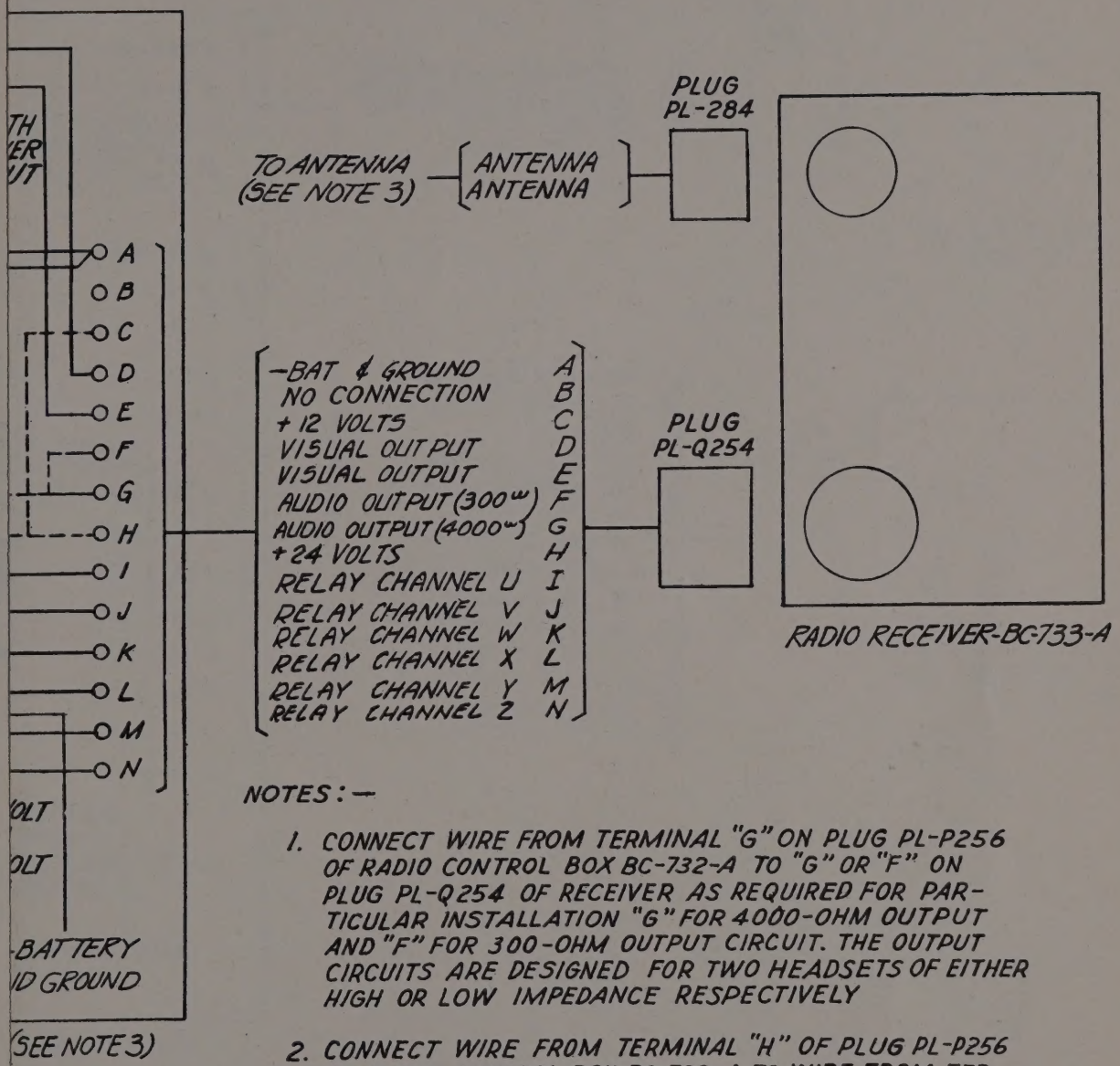


Figure 13 — DIMENSIONS AND WEIGHT OF DYNAMOTOR DM-53-A OR DYNAMOTOR DM-53-AZ



NOTES:—

1. CONNECT WIRE FROM TERMINAL "G" ON PLUG PL-P256 OF RADIO CONTROL BOX BC-732-A TO "G" OR "F" ON PLUG PL-Q254 OF RECEIVER AS REQUIRED FOR PARTICULAR INSTALLATION "G" FOR 4000-OHM OUTPUT AND "F" FOR 300-OHM OUTPUT CIRCUIT. THE OUTPUT CIRCUITS ARE DESIGNED FOR TWO HEADSETS OF EITHER HIGH OR LOW IMPEDANCE RESPECTIVELY

2. CONNECT WIRE FROM TERMINAL "H" OF PLUG PL-P256 OF RADIO CONTROL BOX BC-732-A TO WIRE FROM TERMINAL "H" OF PLUG PL-Q254 ON RECEIVER FOR 24-VOLT SYSTEM AND TO WIRE FROM TERMINAL "C" OF PLUG PL-Q254 ON RECEIVER FOR 12-VOLT SYSTEM

3. NOT PART OF RADIO RECEIVING EQUIPMENT RC-103-A OR RC-103-AZ

Figure 14 — INTERCONNECTING DIAGRAM FOR ALL COMPONENTS OF RADIO RECEIVING EQUIPMENT RC-103-A AND RADIO RECEIVING EQUIPMENT RC-103-AZ

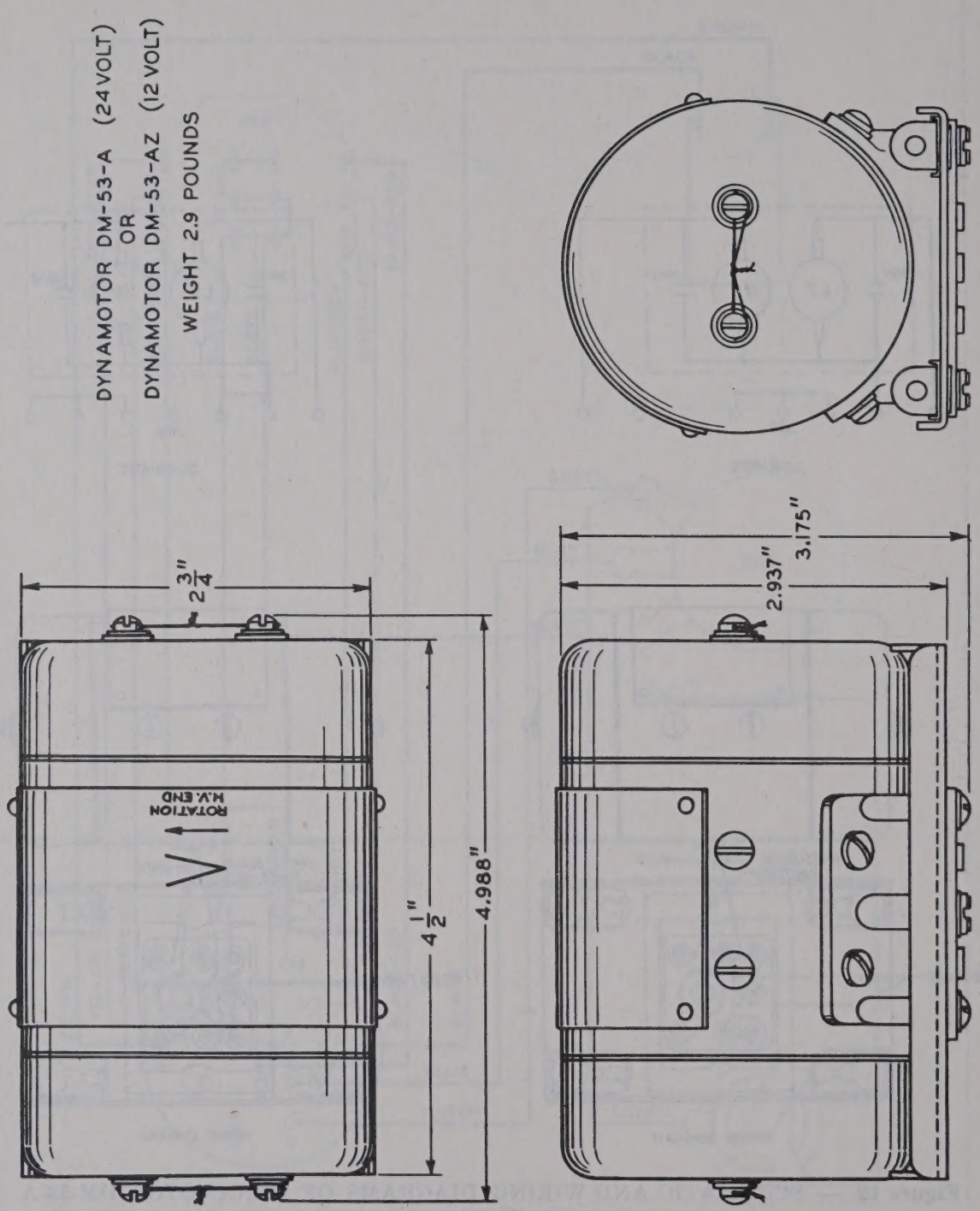
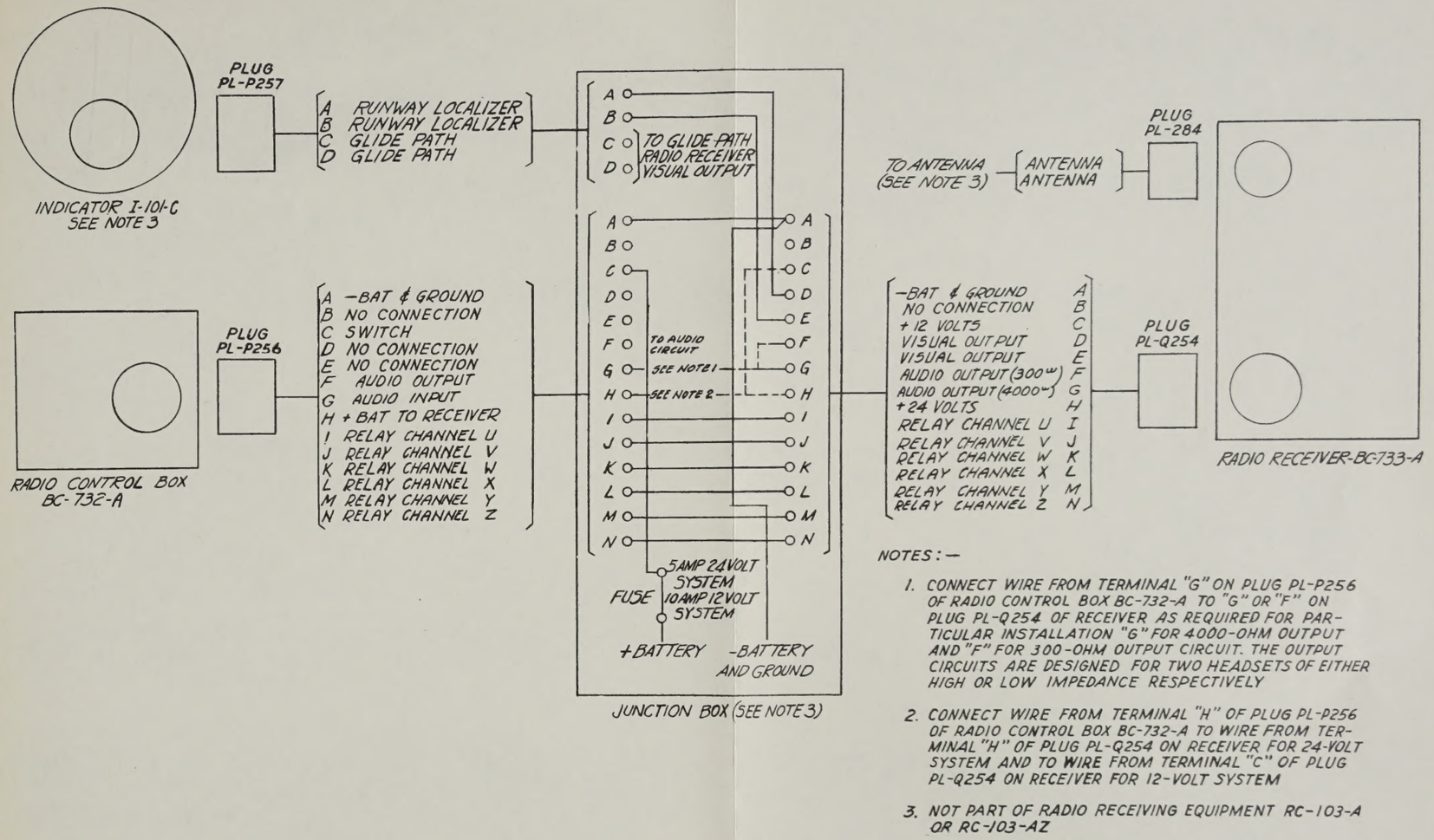


Figure 13 — DIMENSIONS AND WEIGHT OF DYNAMOTOR DM-53-A OR DYNAMOTOR DM-53-AZ



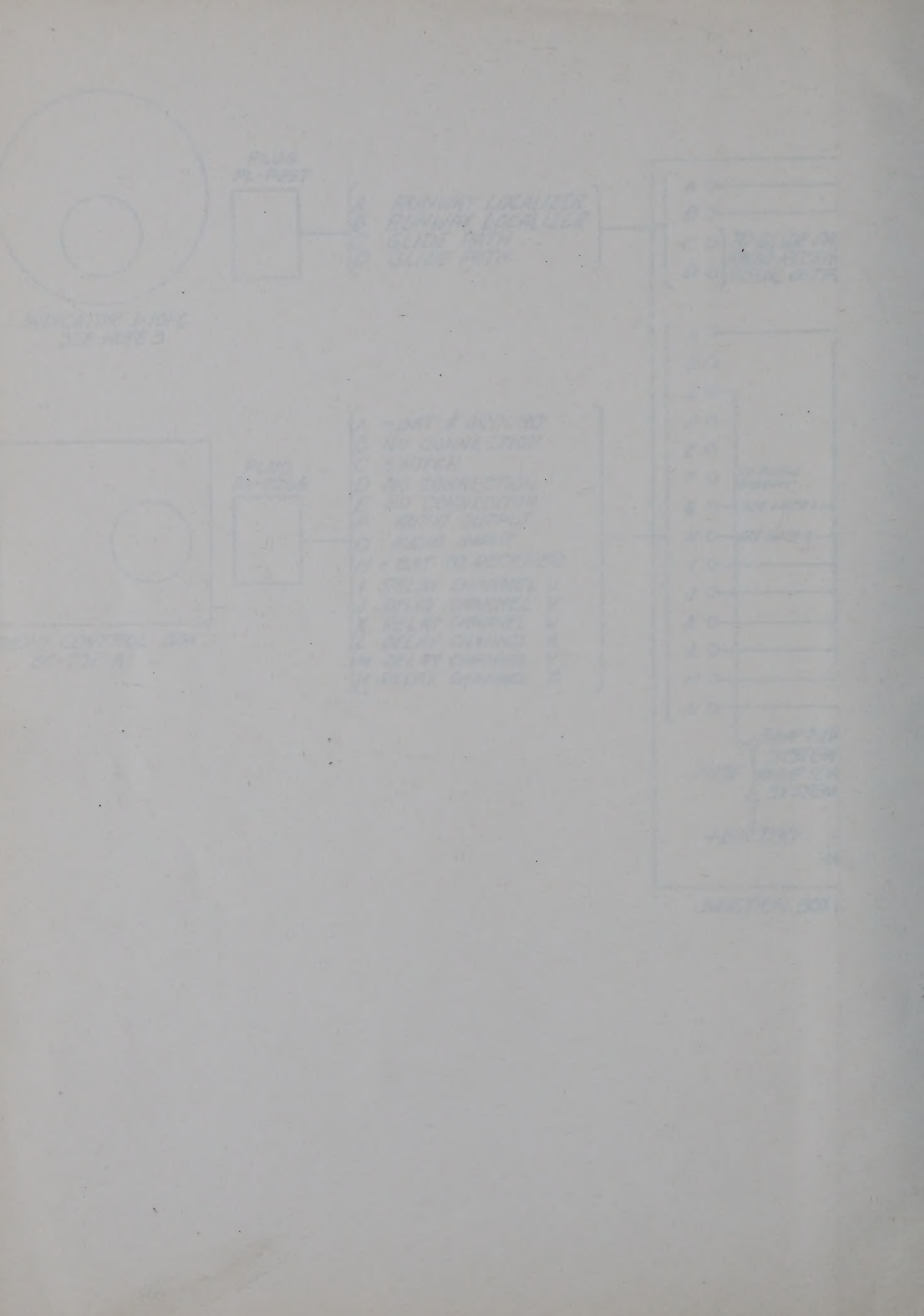
NOTES:—

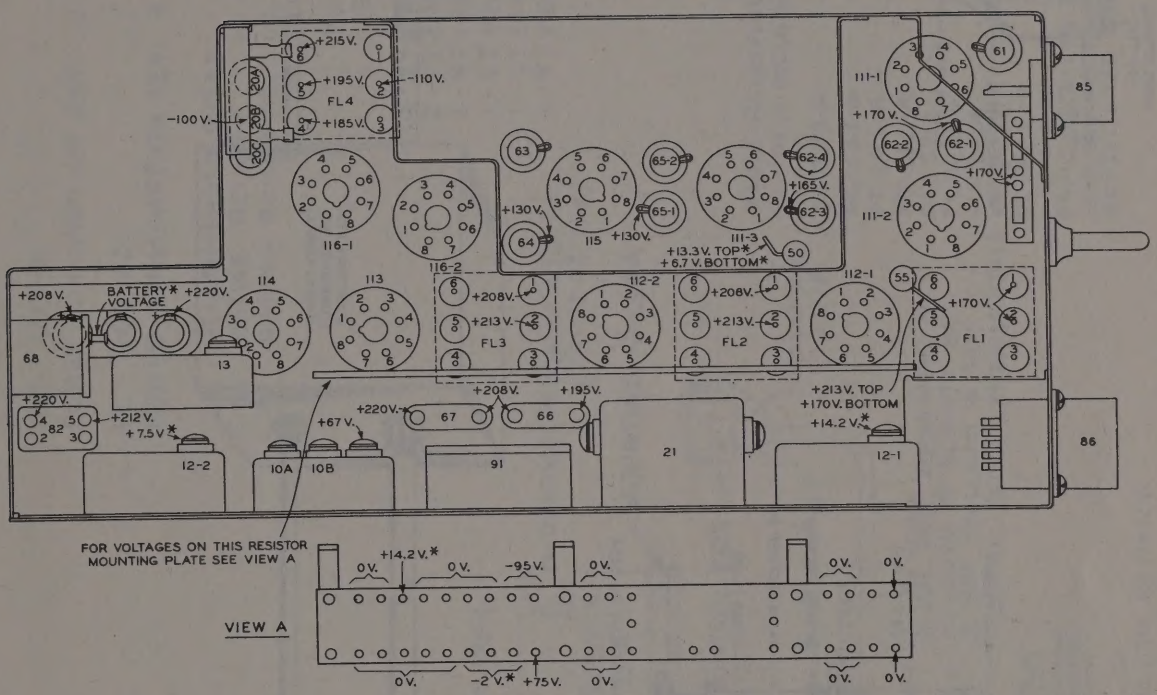
1. CONNECT WIRE FROM TERMINAL "G" ON PLUG PL-P256 OF RADIO CONTROL BOX BC-732-A TO "G" OR "F" ON PLUG PL-Q254 OF RECEIVER AS REQUIRED FOR PARTICULAR INSTALLATION "G" FOR 4000-OHM OUTPUT AND "F" FOR 300-OHM OUTPUT CIRCUIT. THE OUTPUT CIRCUITS ARE DESIGNED FOR TWO HEADSETS OF EITHER HIGH OR LOW IMPEDANCE RESPECTIVELY

2. CONNECT WIRE FROM TERMINAL "H" OF PLUG PL-P256 OF RADIO CONTROL BOX BC-732-A TO WIRE FROM TERMINAL "H" OF PLUG PL-Q254 ON RECEIVER FOR 24-VOLT SYSTEM AND TO WIRE FROM TERMINAL "C" OF PLUG PL-Q254 ON RECEIVER FOR 12-VOLT SYSTEM

3. NOT PART OF RADIO RECEIVING EQUIPMENT RC-103-A OR RC-103-AZ

Figure 14 — INTERCONNECTING DIAGRAM FOR ALL COMPONENTS OF RADIO RECEIVING EQUIPMENT RC-103-A AND RADIO RECEIVING EQUIPMENT RC-103-AZ





VOLTAGES AT VACUUM TUBE SOCKET TERMINALS OF RADIO RECEIVER BC-733-A																				
	28 VOLTS AT BATTERY										14 VOLTS AT BATTERY									
TERM. NO.	111-1	111-2	112-1	112-2	113	114	115	111-3	116-1	116-2	111-1	111-2	112-1	112-2	113	114	115	111-3	116-1	116-2
1	0	0	0	0	75**	0	0	0	0	0	0	0	0	0	75**	0	0	0	0	0
2	6.8*	0	13.6*	13.6*	0	13.6*	0	6.8*	-25	0	6.6*	0	13.2*	13.2*	0	13.2*	0	6.6*	-25	0
3	0	1.6*	0	0	75**	220	130	0	0	7.5*	0	1.6*	0	0	75**	220	130	0	0	7.5*
4	0	0	-0.5*	-0.5*		213	0	0	-55	0	0	0	-0.5*	-0.5*		213	0	0	-55	0
5	0	2.1	0	0		0	0	0	-55	0	0	2.1	0	0		0	0	0	-55	0
6	100	112	125	125	213	0	***	115	217	186	100	112	125	125	213	0	***	115	217	186
7	13.6*	6.8*	27.2	27.2	0	27.2	0	0	13.6*	13.6*	13.2*	6.6*	0	0	0	0	0	0	13.2*	13.2*
8	170	170	208	208	13.6*	14.6*	13.6*	165	27.2	0	170	170	208	208	13.2*	14.6*	13.2*	165	0	0

* THESE VOLTAGES MEASURED ON 25-VOLT SCALE, 1000 OHMS PER VOLT METER

** THIS VOLTAGE SUBJECT TO GREATER THAN 10 PER-CENT VARIATION

*** MEASURE THIS VOLTAGE AT TOP OF COIL 64 WITH CRYSTAL IN CIRCUIT, 130 VOLTS

NOTE: EXCEPT WHERE OTHERWISE NOTED, ALL VOLTAGES MEASURED WITH 250-VOLT SCALE, 1000 OHMS PER VOLT METER

Figure 15 — TUBE SOCKET LAYOUT WITH VOLTAGES AT ALL PINS AND IMPORTANT CIRCUIT TERMINATIONS

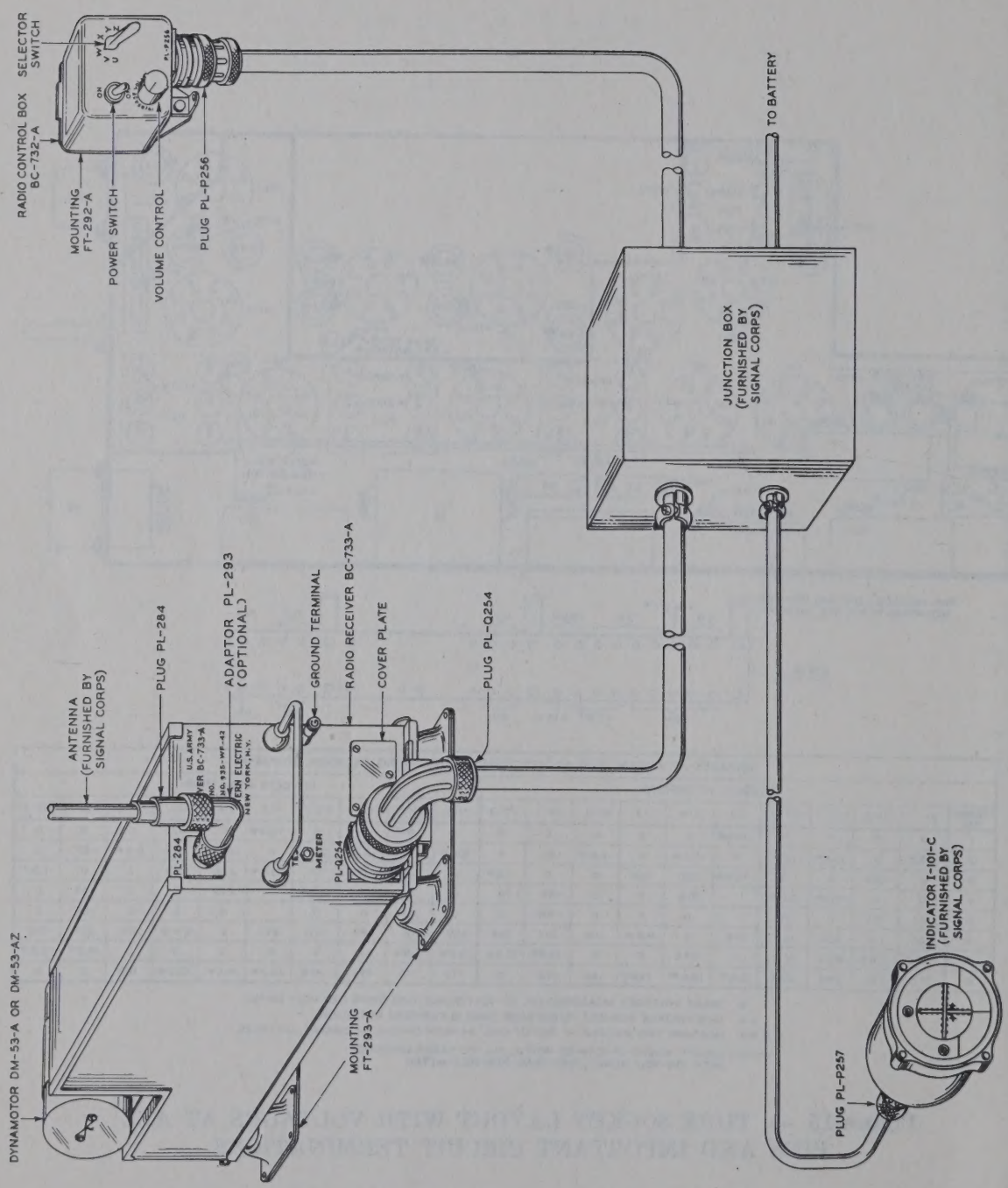
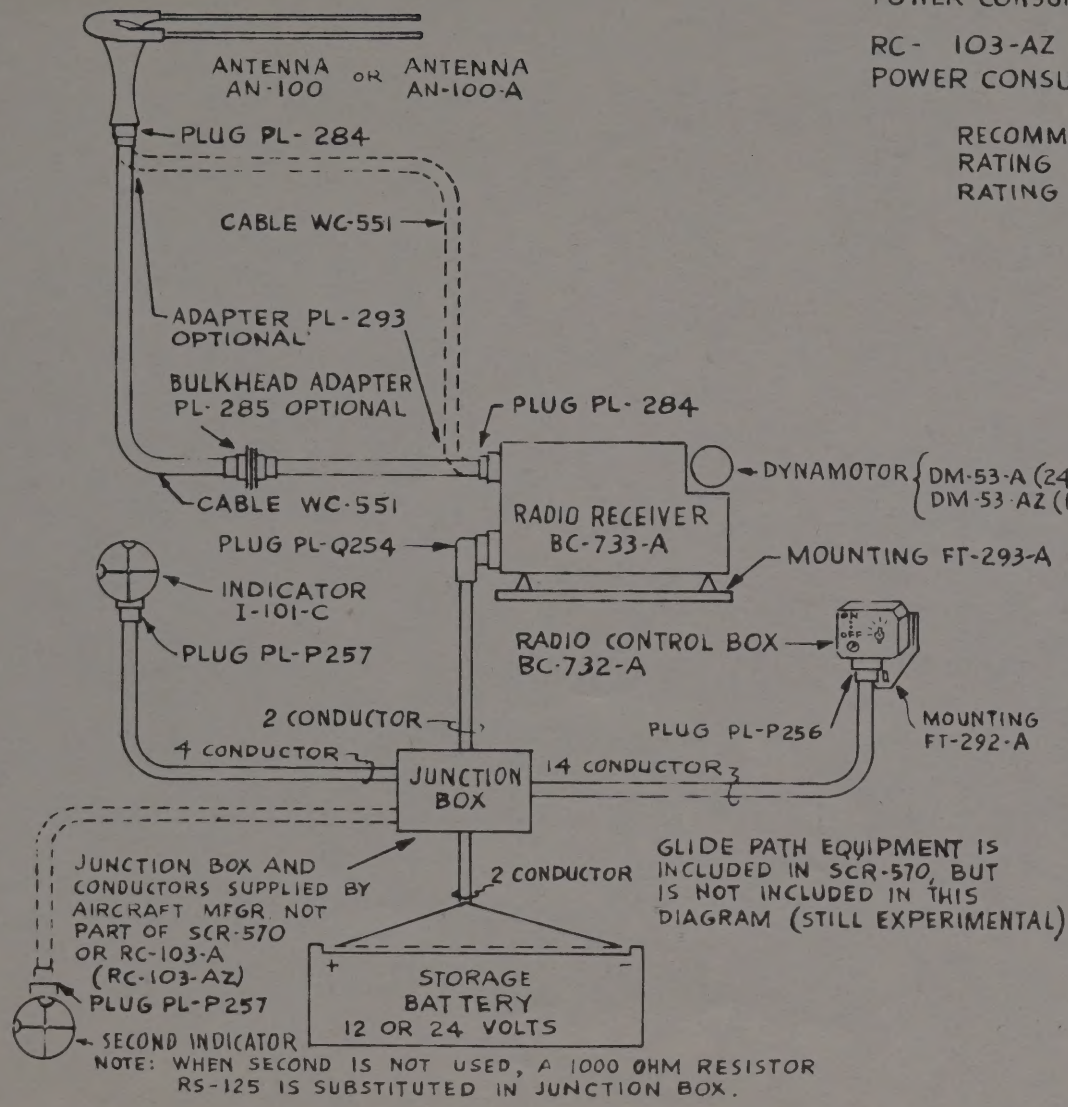


Figure 16 — CONDUIT AND CORDING DIAGRAM FOR RADIO RECEIVING EQUIPMENT RC-103-A AND RADIO RECEIVING EQUIPMENT RC-103-AZ



GLIDE PATH EQUIPMENT IS INCLUDED IN SCR-570, BUT IS NOT INCLUDED IN THIS DIAGRAM (STILL EXPERIMENTAL)

RC- 103-A
POWER CONSUMPTION 24V. 2.25 A.

RC- 103-AZ
POWER CONSUMPTION 12V. 4.5 A.

RECOMMENDED FUSES
RATING RC-103-A 10 AMPS.
RATING RC-103-AZ 10 AMPS.

TUBE LIST
RC-103

3 - VT 269 - WE-717A
2 - VT 209 - RCA-12SG7
2 - VT 133 - RCA-12SR7
1 - VT 104 - RCA-12SQ7
1 - VT 134 - RCA-12A6
1 - VT 207 - RCA-12AH7GT

RADIO RECEIVING EQUIPMENT RC-103-A INCLUDES FOLLOWING:

BC-733-A
BC-732-A
FT-293-A
FT-292-A
DM-53-A
PL-Q254
PL-284
PL-P256
PL-P257

RADIO RECEIVER EQUIPMENT RC-103-AZ SAME AS ABOVE EXCEPT DM-53-AZ IS SUBSTITUTED FOR DM-53-A

Figure 17 — INTERCONNECTING DIAGRAM FOR COMPONENTS OF RADIO SET SCR-570